

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
16 January 2003 (16.01.2003)

PCT

(10) International Publication Number
WO 03/004488 A1(51) International Patent Classification: C07D 403/04,
471/04, 487/08, 473/00, 401/14, 403/14, 491/04, A61K
31/4184, A61P 5/50, 25/00, 25/16, 37/02Teresa [US/US]; 3359 Ticonderoga Drive, Fairfield, CA
94533 (US).

(21) International Application Number: PCT/US02/20844

(74) Agent: GUTH, Joseph H.; Chiron Corporation, Intellec-
tual Property Department, 4560 Horton Street, Emeryville,
CA 94608-2917 (US).

(22) International Filing Date: 2 July 2002 (02.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/302,791 3 July 2001 (03.07.2001) US(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI,
SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU,
ZA, ZW.(71) Applicant (*for all designated States except US*): CHI-
RON CORPORATION [US/US]; 4560 Horton Street,
Emeryville, CA 94608-2916 (US).(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK,
TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): RENHOWE, Paul
A. [US/US]; 262 Stetson Drive, Danville, CA 94506 (US).
SHAFFER, Cynthia M. [US/US]; 4868 El Grande Place,
El Sobrante, CA 94803 (US). McBRIDE, Chris [US/US];
3107 Berlin Way, Oakland, CA 94602 (US). SILVER, Joel
[US/US]; 5929 Alameda Avenue, Apt. 206, El Cerrito, CA
94530 (US). PECCHI, Sabina [IT/US]; 5834 Merriewood
Drive, Oakland, CA 94611 (US). MACHAJEWSKI, Tim
[US/US]; 2514 Norwalk Court, Martinez, CA 94553 (US).
McCREA, Bill [US/US]; 1040 Amato Drive, Berkeley, CA
94705 (US). POON, Daniel [US/US]; 415 Lagunitas Av-
enue, Apt. 103, Oakland, CA 94610 (US). THOMAS,

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: INDAZOLE BENZIMIDAZOLE COMPOUNDS AS TYROSINE AND SERINE/THREONINE KINASE INHIBITORS

(57) Abstract: Organic compounds having the structure I are provided where the variables have the values described herein. Phar-
maceutical formulations and medicaments include the organic compound or a pharmaceutically acceptable salt thereof and a phar-
maceutically acceptable carrier and may be prepared by mixing the organic compound or a pharmaceutically acceptable salt of the
organic compound with a carrier and water. A method of treating a patient includes administering a pharmaceutical formulation or
medicament according to the invention to a patient in need thereof.

WO 03/004488 A1

286
289
436

WO 03/004488

PCT/US02/20844

INDAZOLE BENZIMIDAZOLE COMPOUNDS AS TYROSINE AND SERINE/THREONINE KINASE INHIBITORS

FIELD OF THE INVENTION

This invention pertains generally to methods and compositions for treating a variety of patients and cell subjects. More particularly, the present
5 invention provides novel compositions of matter and methods for angiogenesis inhibition, treating cancer, treating diabetes, stimulating insulin-dependent processes, treating Alzheimer's disease, treating central nervous system disorders, prolonging immune responses, reducing the splitting of centrosomes, blocking DNA repair, modulating cell cycle arrest, and inhibiting enzymes such as serine/threonine
10 kinases and tyrosine kinases. The present invention thus has application in the areas of oncology, diabetes, immunology, and medicinal chemistry.

BACKGROUND OF THE INVENTION

Capillaries reach into almost all tissues of the human body and supply tissues with oxygen and nutrients as well as removing harmful waste products.
15 Under typical conditions, the endothelial cells lining capillaries do not divide, and capillaries, therefore, do not normally increase in number or size in a human adult. Under certain normal conditions, however, such as when a tissue is damaged, or during certain parts of the menstrual cycle, capillaries begin to proliferate rapidly. This process of forming new capillaries from pre-existing blood vessels is known as
20 angiogenesis or neovascularization. See Folkman, J. Scientific American 275, 150-154 (1996). Angiogenesis during wound healing is an example of pathophysiological neovascularization during adult life. During wound healing, the additional capillaries provide a supply of oxygen and nutrients, promote granulation tissue, and aid in waste removal. After termination of the healing process, the
25 capillaries normally regress. Lymboussaki, A. "Vascular Endothelial Growth Factors and their Receptors in Embryos, Adults, and in Tumors" Academic

WO 03/004488

PCT/US02/20844

-2-

Dissertation, University of Helsinki, Molecular/Cancer Biology Laboratory and Department of Pathology, Haartman Institute, (1999).

Angiogenesis also plays an important role in the growth of cancer cells. It is known that once a nest of cancer cells reaches a certain size, roughly 1 to 2 mm in diameter, the cancer cells must develop a blood supply in order for the tumor to grow larger as diffusion will not be sufficient to supply the cancer cells with enough oxygen and nutrients. A compound that inhibits angiogenesis will thus act to retard or halt the growth of cancer cells.

Receptor tyrosine kinases (RTKs) are polypeptides that regulate developmental cell growth and differentiation and remodeling and regeneration of adult tissues. Mustonen, T. et al., *J. Cell Biology* 129, 895-898 (1995); van der Geer, P. et al. *Ann Rev. Cell Biol.* 10, 251-337 (1994). Polypeptide ligands known as growth factors or cytokines, are known to activate RTKs. Signaling involves ligand binding and a shift in conformation in the external domain of the receptor resulting in its dimerization. Lymboussaki, A. "Vascular Endothelial Growth Factors and their Receptors in Embryos, Adults, and in Tumors" Academic Dissertation, University of Helsinki, Molecular/Cancer Biology Laboratory and Department of Pathology, Haartman Institute, (1999); Ullrich, A. et al., *Cell* 61, 203-212 (1990). Binding of the ligand to the RTK results in receptor trans-phosphorylation at specific tyrosine residues and activation of the catalytic domains for the phosphorylation of cytoplasmic substrates. Id.

Two subfamilies of RTKs are specific to the vascular endothelium. These include the VEGF subfamily and the Tie receptor subfamily. Class III RTKs include VEGFR-1, VEGFR-2, and VEGFR-3. Shibuya, M. et al., *Oncogene* 5, 519-525 (1990); Terman, B. et al., *Oncogene* 6, 1677-1683 (1991); Aprelikova, O. et al., *Cancer Res.* 52, 746-748 (1992).

A number of substances have been identified that promote angiogenesis. These include angiopoietin-1, basic fibroblast growth factor (bFGF)

WO 03/004488

PCT/US02/20844

-3-

and vascular endothelial growth factor (VEGF). VEGF was first described as a protein able to induce vascular permeability and endothelial cell proliferation and was identified as a major inducer of angiogenesis and vasculogenesis. Ferrara, N. et al., *Endocrinol. Rev.* 18, 4-25 (1997). VEGF is known to specifically bind to
5 RTKs including VEGFR-1 and VEGFR-2. DeVries, C. et al., *Science* 255, 989-991 (1992); Quinn, T. et al., *Proc. Natl. Acad. Sci.* 90, 7533-7537 (1993). It is now known that VEGF stimulates the migration and proliferation of endothelial cells and induces angiogenesis both in vitro and in vivo. Connolly, D. et al., *J. Biol. Chem.* 264, 20017-20024 (1989); Connolly, D. et al., *J. Clin. Invest.* 84, 1470-
10 1478 (1989); Ferrara, N. et al., *Endocrino. Rew.* 18, 4-25 (1997); Leung, D. et al., *Science* 246, 1306-1309 (1989); Plouet, J. et al., *EMBO J* 8, 3801-3806 (1989).

Because angiogenesis is known to be critical to the growth of cancer and to be controlled by VEGF and VEGF-RTK, substantial efforts have been undertaken to develop compounds which inhibit or retard angiogenesis and inhibit
15 VEGF-RTK.

Platelet derived growth factor receptor kinase (PDGFRK) is another type of RTK. PDGF expression has been shown in a number of different solid tumors, from glioblastomas to prostate carcinomas. In these various tumor types, the biological role of PDGF signaling can vary from autocrine stimulation of
20 cancer cell growth to more subtle paracrine interactions involving adjacent stroma and angiogenesis. Therefore, inhibiting the PDGFR kinase activity with small molecules may interfere with tumor growth and angiogenesis.

Tie-2 is a membrane RTK. Upon binding to its ligand, Tie-2 is activated and phosphorylates its downstream signal proteins. Tie-2 kinase activity
25 may then trigger a pathway of cellular response that leads to stabilization of vascular vessels in cancer. Therefore, blocking kinase activity of Tie-2, in synergy with blockage of activity of other angiogenic kinases such as VEGF and bFGF receptor kinases, may be effective in cutting off the blood supply to cancer cells and in treating the disease.

WO 03/004488

PCT/US02/20844

-4-

Glycogen synthase kinase 3 (GSK-3) is a serine/threonine kinase for which two isoforms, α and β , have been identified. Woodgett, *Trends Biochem. Sci.*, 16:177-81 (1991). Both GSK-3 isoforms are constitutively active in resting cells. GSK-3 was originally identified as a kinase that inhibits glycogen synthase by direct phosphorylation. Upon insulin activation, GSK-3 is inactivated, thereby allowing the activation of glycogen synthase and possibly other insulin-dependent events, such as glucose transport. Subsequently, it has been shown that GSK-3 activity is also inactivated by other growth factors that, like insulin, signal through receptor tyrosine kinases (RTKs). Examples of such signaling molecules include IGF-1 and EGF. Saito et al., *Biochem. J.*, 303:27-31 (1994); Welsh et al., *Biochem. J.* 294:625-29 (1993); and Cross et al., *Biochem. J.*, 303:21-26 (1994).

Agents that inhibit GSK-3 activity are useful in the treatment of disorders that are mediated by GSK-3 activity. In addition, inhibition of GSK-3 mimics the activation of growth factor signaling pathways and consequently GSK-3 inhibitors are useful in the treatment of diseases in which such pathways are insufficiently active. Examples of diseases that can be treated with GSK-3 inhibitors are described below.

Type 2 diabetes is an increasingly prevalent disease of aging. It is initially characterized by decreased sensitivity to insulin and a compensatory elevation in circulating insulin concentrations, the latter of which is required to maintain normal blood glucose levels. Increased insulin levels are caused by increased secretion from the pancreatic beta cells, and the resulting hyperinsulinemia is associated with cardiovascular complications of diabetes. As insulin resistance worsens, the demand on the pancreatic beta cells steadily increases until the pancreas can no longer provide adequate levels of insulin, resulting in elevated levels of glucose in the blood. Ultimately, overt hyperglycemia and hyperlipidemia occur, leading to the devastating long-term complications associated with diabetes, including cardiovascular disease, renal failure and blindness. The exact mechanism(s) causing type 2 diabetes are unknown, but result in impaired

WO 03/004488

PCT/US02/20844

-5-

- glucose transport into skeletal muscle and increased hepatic glucose production, in addition to inadequate insulin response. Dietary modifications are often ineffective, therefore the majority of patients ultimately require pharmaceutical intervention in an effort to prevent and/or slow the progression of the complications of the disease.
- 5 Many patients can be treated with one or more of the many oral anti-diabetic agents available, including sulfonylureas, to increase insulin secretion. Examples of sulfonylurea drugs include metformin for suppression of hepatic glucose production, and troglitazone, an insulin-sensitizing medication. Despite the utility of these agents, 30-40% of diabetics are not adequately controlled using these medications
- 10 and require subcutaneous insulin injections. Additionally, each of these therapies has associated side effects. For example, sulfonylureas can cause hypoglycemia and troglitazone can cause severe hepatotoxicity. Presently, there is a need for new and improved drugs for the treatment of prediabetic and diabetic patients.

- As described above, GSK-3 inhibition stimulates insulin-dependent
- 15 processes and is consequently useful in the treatment of type 2 diabetes. Recent data obtained using lithium salts provides evidence for this notion. The lithium ion has recently been reported to inhibit GSK-3 activity. Klein et al., *PNAS* 93:8455-9 (1996). Since 1924, lithium has been reported to have antidiabetic effects including the ability to reduce plasma glucose levels, increase glycogen uptake, potentiate
- 20 insulin, up-regulate glucose synthase activity and to stimulate glycogen synthesis in skin, muscle and fat cells. However, lithium has not been widely accepted for use in the inhibition of GSK-3 activity, possibly because of its documented effects on molecular targets other than GSK-3. The purine analog 5-iodotubercidin, also a GSK-3 inhibitor, likewise stimulates glycogen synthesis and antagonizes inactivation
- 25 of glycogen synthase by glucagon and vasopressin in rat liver cells. Fluckiger-Isler et al., *Biochem J.* 292:85-91 (1993); and Massillon et al., *Biochem J.* 299:123-8 (1994). However, this compound has also been shown to inhibit other serine/threonine and tyrosine kinases. Massillon et al., *Biochem J.* 299:123-8 (1994).

WO 03/004488

PCT/US02/20844

-6-

GSK-3 is also involved in biological pathways relating to Alzheimer's disease (AD). The characteristic pathological features of AD are extracellular plaques of an abnormally processed form of the amyloid precursor protein (APP), so called β -amyloid peptide (β -AP) and the development of intracellular neurofibrillary tangles containing paired helical filaments (PHF) that consist largely of hyperphosphorylated tau protein. GSK-3 is one of a number of kinases that have been found to phosphorylate tau protein in vitro on the abnormal sites characteristic of PHF tau, and is the only kinase also demonstrated to do this in living cells and in animals. Lovestone et al., *Current Biology* 4:1077-86 (1994); and Brownlees et al., *Neuroreport* 8: 3251-3255 (1997). Furthermore, the GSK-3 kinase inhibitor, LiCl, blocks tau hyperphosphorylation in cells. Stambolic et al., *Current Biology* 6:1664-8 (1996). Thus GSK-3 activity may contribute to the generation of neurofibrillary tangles and consequently to disease progression. Recently it has been shown that GSK-3 β associates with another key protein in AD pathogenesis, presenillin 1 (PS1). Takashima et al., *PNAS* 95:9637-9641 (1998). Mutations in the PS1 gene lead to increased production of β -AP, but the authors also demonstrate that the mutant PS1 proteins bind more tightly to GSK-3 β and potentiate the phosphorylation of tau, which is bound to the same region of PS1.

It has also been shown that another GSK-3 substrate, β -catenin, binds to PS1. Zhong et al., *Nature* 395:698-702 (1998). Cytosolic β -catenin is targeted for degradation upon phosphorylation by GSK-3 and reduced β -catenin activity is associated with increased sensitivity of neuronal cells to β -AP induced neuronal apoptosis. Consequently, increased association of GSK-3 β with mutant PS1 may account for the reduced levels of β -catenin that have been observed in the brains of PS1-mutant AD patients and to the disease related increase in neuronal cell-death. Consistent with these observations, it has been shown that injection of GSK-3 antisense but not sense, blocks the pathological effects of β -AP on neurons in vitro, resulting in a 24 hour delay in the onset of cell death and increased cell survival at 1 hr from 12 to 35%. Takashima et al., *PNAS* 90:7789-93. (1993). In these latter studies, the effects on cell-death are preceded (within 3-6 hours of β -AP

WO 03/004488

PCT/US02/20844

-7-

administration) by a doubling of intracellular GSK-3 activity, suggesting that in addition to genetic mechanisms that increase the proximity of GSK-3 to its substrates, β -AP may actually increase GSK-3 activity. Further evidence for a role for GSK-3 in AD is provided by the observation that the protein expression level
5 (but, in this case, not specific activity) of GSK-3 is increased by 50 % in postsynaptosomal supernatants of AD vs. normal brain tissue. Pei et al., *J. Neuropathol Exp.*, 56:70-78 (1997). Thus, specific inhibitors of GSK-3 should slow the progression of Alzheimer's Disease.

In addition to the effects of lithium described above, there is a long
10 history of the use of lithium to treat bipolar disorder (manic depressive syndrome). This clinical response to lithium may reflect an involvement of GSK-3 activity in the etiology of bipolar disorder, in which case GSK-3 inhibitors could be relevant to that indication. In support of this notion it was recently shown that valproate, another drug commonly used in the treatment of bipolar disorder, is also a GSK-3
15 inhibitor. Chen et al., *J. Neurochemistry*, 72:1327-1330 (1999). One mechanism by which lithium and other GSK-3 inhibitors may act to treat bipolar disorder is to increase the survival of neurons subjected to aberrantly high levels of excitation induced by the neurotransmitter, glutamate. Nonaka et al., *PNAS* 95: 2642-2647 (1998). Glutamate-induced neuronal excitotoxicity is also believed to be a major
20 cause of neurodegeneration associated with acute damage, such as in cerebral ischemia, traumatic brain injury and bacterial infection. Furthermore it is believed that excessive glutamate signaling is a factor in the chronic neuronal damage seen in diseases such as Alzheimer's, Huntingdon's, Parkinson's, AIDS associated dementia, amyotrophic lateral sclerosis (AML) and multiple sclerosis (MS).
25 Thomas, *J. Am. Geriatr. Soc.* 43: 1279-89 (1995). Consequently, GSK-3 inhibitors should provide a useful treatment in these and other neurodegenerative disorders.

GSK-3 phosphorylates transcription factor NF-AT and promotes its export from the nucleus, in opposition to the effect of calcineurin. Beals et al., *Science* 275:1930-33 (1997). Thus, GSK-3 blocks early immune response gene

WO 03/004488

PCT/US02/20844

-8-

activation via NF-AT, and GSK-3 inhibitors may tend to permit or prolong activation of immune responses. Thus, GSK-3 inhibitors are believed to prolong and potentiate the immunostimulatory effects of certain cytokines, and such an effect may enhance the potential of those cytokines for tumor immunotherapy or indeed
5 for immunotherapy in general.

Lithium has other biological effects. It is a potent stimulator of hematopoiesis, both in vitro and in vivo. Hammond et al., *Blood* 55: 26-28 (1980). In dogs, lithium carbonate eliminated recurrent neutropenia and normalized other blood cell counts. Doukas et al. *Exp. Hematol.* 14: 215-221 (1986). If these effects
10 of lithium are mediated through the inhibition of GSK-3, GSK-3 inhibitors may have even broader applications. Since inhibitors of GSK-3 are useful in the treatment of many diseases, the identification of new inhibitors of GSK-3 would be highly desirable.

NEK-2 is a mammalian serine threonine kinase, which is structurally
15 related to the NimA kinase from the fungus *Aspergillus nidulans*. Mutations in NimA result in G2 phase arrest of cells and overexpression of wt NimA results in premature chromatin condensation, even when ectopically expressed in mammalian cells. Both protein and kinase levels peak in S/G2 phase of the cell cycle. NimA also appears to be required for the localization of cdk1/cyclinB complex to the
20 nucleus and spindle pole body. Histone H3 has been shown to be an in vitro substrate for the kinase, and if this is also the case in vivo, it may explain the role of the kinase in chromosome condensation. Six NimA kinases have been identified to date in mammals, and of these, NEK-2 appears to be the most closely related to NimA. It's activity is also cell cycle regulated, peaking in S/G2 phase.
25 Overexpression of NEK-2, however, does not affect chromatin condensation but instead results in a pronounced splitting of centrosomes, possibly due to the loss of centriole/centriole adhesion. There is evidence that NEK-2 is regulated by phosphorylation and can interact with protein phosphatase PP1. NEK-2 is ubiquitously expressed and appears to be most abundant in testis. Hyseq cluster

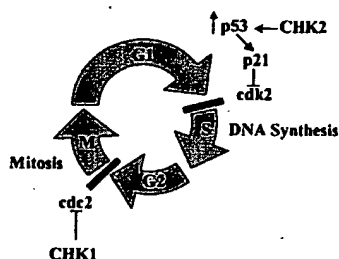
WO 03/004488

PCT/US02/20844

-9-

374113, containing only NEK-2 sequences shows dramatic overexpression of NEK-2 in lymph node metastasis (13.3x) and in primary tumor (6.5x). Inhibition of NEK-2 by antisense oligonucleotides inhibited cell proliferation and reduced the capability of cells to grow in soft agar. In addition, increased cell death was
 5 observed in these cells both in the presence and absence of cisplatin.

Ultraviolet light, ionizing radiation, environmental agents and cytotoxic drugs can result in damage to cellular DNA integrity. When such damage occurs during DNA replication or cell division it is potentially catastrophic and may result in cell death. The cellular response is to arrest the cell cycle at one of two
 10 checkpoints (G1/S or G2/M) to either permit DNA repair or initiate apoptosis.



The G1/S checkpoint is regulated by the p53 transcriptional activator protein and the absence of this critical protein is often an important step in tumorigenesis, thus defining p53 as a tumor suppressor. In fact, nearly 50% of all
 15 cancers are p53 defective due to mutation. T. Soussi, *Ann. N.Y. Acad. Sci.*, 910, 121 (2001). In response to DNA damage, checkpoint kinase 2 (CHK-2) phosphorylates p53 and this results in stabilization of the protein and an elevation in p53 levels. A. Hirao et al., *Science*, 287, 1824 (2000). Consequently, negative cell cycle regulators, such as p21Waf1/Cip1, are activated and halt the cell cycle at the G1/S
 20 checkpoint. B. Vogelstein et al., *Nature*, 408, 307 (2000).

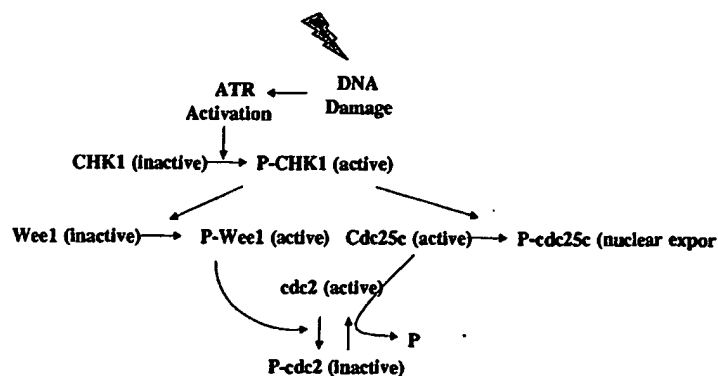
The G2/M checkpoint is monitored by the serine/threonine checkpoint kinase 1 (CHK-1). Upon DNA damage, the protein kinase ATR (ataxia-telangiectasia mutated - rad53 related kinase) is activated. H. Zhao et al., *Mol. Cell Biol.*, 21, 4129 (2001); Q. Liu et al., *Genes Dev.*, 14, 1448 (2000). SATR-

WO 03/004488

PCT/US02/20844

-10-

dependent phosphorylation of CHK-1 promotes its phosphorylation of cdc25 and Wee1 and ultimately inactivation of cdc 2. Thus, CHK-1 phosphorylation of cdc25c targets it for nuclear export to the cytoplasm and as a result the cdc25c phosphatase is rendered unavailable to activate cdc 2 by dephosphorylation. Y. Sanchez et al., *Science*, 277, 1497 (1997); C. Y. Peng et al., *Science*, 277, 1501 (1997); T. A. Chen et al., *Nature*, 401, 616 (1999); and A. Lopez-Girona et al., *Nature*, 397, 172 (1999). In addition, CHK-1 activates the protein kinase Wee1, which phosphorylates and inactivates cdc 2. J. Lee et al. *Mol. Biol. Cell*, 12, 551 (2001); L. L. Parker et al., *Science*, 257, 1955 (1992). These dual pathways thus converge to result in cell cycle arrest. Because cell cycle arrest is a potential mechanism by which tumor cells can overcome the damage induced by cytotoxic agents, abrogation of these checkpoints with novel therapeutic agents should increase the sensitivity of tumors to chemotherapy. The presence of two checkpoints, coupled with the tumor specific abrogation of one of these by p53 mutations in 50% of cancers, can be exploited to design tumor-selective agents. Thus, in p53 minus tumors, therapeutic inhibition of G2/M arrest leaves cancerous cells no options for DNA damage repair and results in apoptosis. Normal cells have wild type p53 and retain an intact G1/S checkpoint. Thus these cells have an opportunity to correct DNA damage and survive. One approach to the design of chemosensitizers that abrogate the G2/M checkpoint is to identify inhibitors of the key G2/M regulatory kinase, CHK-1.



The synthesis of various quinoline derivatives is disclosed in WO 97/48694. These compounds are disclosed as capable of binding to nuclear

WO 03/004488

PCT/US02/20844

-11-

hormone receptors and being useful for stimulating osteoblast proliferation and bone growth. The compounds are also disclosed as being useful in the treatment or prevention of diseases associated with nuclear hormone receptor families.

Various quinoline derivatives in which the benzene ring of the
5 quinolone is substituted with a sulfur group are disclosed in WO 92/18483. These compounds are disclosed as being useful in pharmaceutical formulations and as medicaments.

Various indolyl substituted compounds have recently been disclosed
in WO 01/29025, and various benzimidazolyl substituted compounds have recently
10 been disclosed in WO 01/28993. Such compounds are reportedly capable of inhibiting, modulating and/or regulating signal transduction of both receptor-type and non-receptor type tyrosine kinases. Neither of the PCT publications discloses benzimidazole-substituted indazoles.

Various indazole compounds and pharmaceutical formulations
15 containing them are disclosed in WO 01/02369 and recently published WO 01/53268. Such compositions are purportedly useful for mediating tyrosine kinase signal transduction and thereby modulating and/or inhibiting cell proliferation. Some of the disclosed compounds include the benzimidazole group. Various benzimidazoles substituted with $-C(=O)-NH_2$ are disclosed in WO 00/68206 as
20 useful as inhibitors of the enzyme poly(ADP-ribose)polymerase and for use in producing medicaments.

A continuing need exists for compounds that inhibit the proliferation
of capillaries, inhibit the growth of tumors, treat cancer, treat diabetes, stimulate
insulin-dependent processes, treat Alzheimer's disease, treat central nervous system
25 disorders, prolong immune responses, reduce the splitting of centrosomes, block DNA repair, modulate cell cycle arrest, and/or inhibit enzymes such as flt-1 (VEGFR2), KDR (VEGFR2), Flk-1, bFGFR, GSK-3, NEK-2, CHK-1, Tie-2, PDGF, and cdc 2, and pharmaceutical formulations and medicaments that contain

WO 03/004488

PCT/US02/20844

-12-

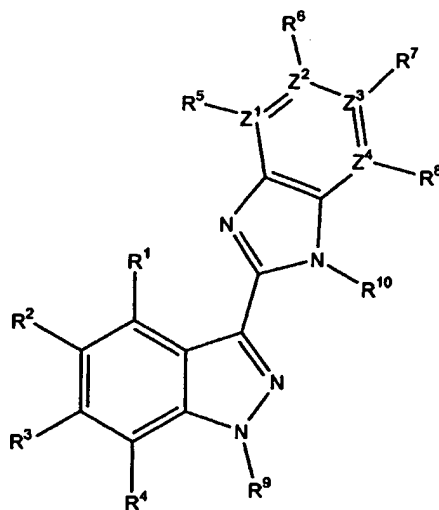
such compounds. A need also exists for methods for administering such compounds, pharmaceutical formulations, and medicaments to patients or subjects in need thereof.

SUMMARY OF THE INVENTION

- 5 The present invention provides compounds, pharmaceutical formulations and medicaments including the compounds, methods of preparing the pharmaceutical formulations, medicaments, and compounds, and methods of treating patients with the pharmaceutical formulations and compounds.

The present invention provides compounds having the structure I.

- 10 The invention also provides tautomers of the compounds, pharmaceutically acceptable salts of the compounds, and pharmaceutically acceptable salts of the tautomers. Structure I has the following formula:



I

where, in a first group of compounds:

- 15 Z^1 , Z^2 , Z^3 , and Z^4 are selected independently from C or N;

WO 03/004488

PCT/US02/20844

-13-

R^1 - R^8 are selected independently from the group consisting of -H, -F, -Cl, -Br, -C \equiv N, -NO₂, -CF₃, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted alkylheterocyclyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heteroaryl groups, substituted and unsubstituted -C(=O)-N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heteroaryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted aryl groups, substituted and unsubstituted heteroaryl groups, and substituted and unsubstituted heterocyclyl groups;

R^9 is -H, -C(=O)-alkyl, or -C(=O)-aryl; and

R^{10} is -H, -C(=O)-alkyl, or -C(=O)-aryl.

More particular embodiments of the compounds of the invention having the general structure shown in I above are provided in a second group of compounds. The second group of compounds are those for which:

WO 03/004488

PCT/US02/20844

-14-

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, and -Br;

R^2 is selected from -H, -F, -Cl, -Br, -C \equiv N, -NO $_2$, -CO $_2$ H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted heterocyclylalkoxy groups;

R^3 is selected from -H, -F, -Cl, -Br, and substituted and unsubstituted alkoxy groups;

R^4 is -H;

R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^5 is absent if Z^1 is N;

R^6 is selected from -H, -F, -Cl, -Br, -CF $_3$, -CO $_2$ H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy

WO 03/004488

PCT/US02/20844

-15-

groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, and substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, and substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

WO 03/004488

PCT/US02/20844

-16-

R^8 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^8 is absent if Z^4 is N;

R^9 is -H; and

R^{10} is -H. In some embodiments of the second group of compounds, at least one of R^1 , R^2 , R^3 , R^5 , R^6 , R^7 or R^8 is not -H. In other such embodiments, at least two of R^1 , R^2 , R^3 , R^5 , R^6 , R^7 or R^8 are not -H.

10 In some embodiments of the second group of compounds, R^3 is selected from -F, -Cl, -Br, and substituted and unsubstituted alkoxy groups.

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a third group of compounds for which:

15 Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-

WO 03/004488

PCT/US02/20844

-17-

- heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
- 5 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
- 10 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 15

- R^2 is selected from -H, -F, -Cl, -Br, -C \equiv N, -NO $_2$, -CO $_2$ H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, and substituted and unsubstituted
- 20 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups,
- 25 substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and
- 30

WO 03/004488

PCT/US02/20844

-18-

unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
 -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
 groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
 5 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
 aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocycloxy,
 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
 10 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
 15 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
 20 unsubstituted arylaminoalkyl groups, substituted and unsubstituted
 heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
 groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,
 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and
 unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
 25 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O-
 such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;

R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, substituted and
 30 unsubstituted alkyl groups, substituted and unsubstituted -C(=O)-O-alkyl groups,

WO 03/004488

PCT/US02/20844

-19-

substituted and unsubstituted amino groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted saturated heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted saturated heterocycyl groups, substituted and

5 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocycyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl

10 groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocycyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted

15 (alkyl)(heterocycylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocycyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocycyl

20 groups;

R⁴ is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted

25 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocycyl groups, substituted and unsubstituted heterocycyl groups, substituted and

30 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted

WO 03/004488

PCT/US02/20844

-20-

- and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
- 5 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
- 10 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
- 15 groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
- 20 C(=O)-alkyl-heterocyclyl groups;

- R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
- 25 groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy

WO 03/004488

PCT/US02/20844

-21-

- groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
- 5 unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted
- 10 heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups; or R^6 is absent if Z^2 is N;
- 15 R^7 is selected from $-H$, $-F$, $-Cl$, $-Br$, $-CF_3$, $-CO_2H$, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and
- 20 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted
- 25 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted
- 30 $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-22-

-C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁸ is absent if Z⁴ is N;

R⁹ is -H; and

R¹⁰ is selected from the group consisting of -H, and substituted or unsubstituted alkyl groups. In some such embodiments of the third group of compounds, at least one of R¹, R², R³, R⁴, R⁵, R⁶, R⁷ or R⁸ is not -H. In other such embodiments, at least two of R¹, R², R³, R⁴, R⁵, R⁶, R⁷ or R⁸ are not -H.

In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is selected from -H, -F, -Cl, and -OMe.

In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is selected from the group consisting of -F, -Cl, -Br, -CF₃, -C≡N, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is selected from the group consisting of substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups. In some such embodiments, R³ is a substituted or unsubstituted -N(H)C(=O)N(H)CH₂CH₃ group,

WO 03/004488

PCT/US02/20844

-23-

- a substituted or unsubstituted $-N(H)C(=O)N(H)CH(CH_3)_2$ group, a substituted or unsubstituted $-N(H)C(=O)N(H)C(CH_3)_3$ group, or a substituted or unsubstituted $-N(H)C(=O)N(H)$ -aryl group or the like. In some such embodiments, R^3 is a substituted or unsubstituted $-N(H)C(=O)N(H)$ -aryl group such as, but not limited to, a $-N(H)C(=O)N(H)$ -(2-methoxyphenyl) group, a $-N(H)C(=O)N(H)$ -(trifluoromethylphenyl) group, or the like.

In another embodiment of the third group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is $-F$, $-Cl$, or $-OMe$.

- 10 In some embodiments of the third group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and if R^3 is H , at least one of R^6 or R^7 is selected from the group consisting of $-CO_2H$, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted cycloalkylheterocyclyl groups, substituted and unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted $-N(H)$ -alkyl groups, substituted and unsubstituted $-N(H)$ -alkyl-heterocyclyl groups, substituted and unsubstituted $-N(H)$ -alkyl-aryl groups, substituted and unsubstituted $-N(H)$ -heterocyclyl groups, substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups. In some such embodiments, if R^3 is H , at least one of R^6 or R^7 is selected from the group consisting of $-CO_2H$, substituted and unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups.

WO 03/004488

PCT/US02/20844

-24-

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from a first group of compounds; or Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from the first group of compounds, the first group of compounds comprising members selected from the group consisting of $-CO_2H$, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted cycloalkylheterocyclyl groups, substituted and unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, substituted and unsubstituted heterocyclylamino groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, $-C(=O)N(H)$ -heteroaryl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values defined in the previous embodiments, Z^2 is C, and R^6 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the third group of compounds where R^6 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted

WO 03/004488

PCT/US02/20844

-25-

1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the third group of compounds where R⁶ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, 5 but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited 10 to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl 15 substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, 20 but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl 25 substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a -CH₂C(=O)O-alkyl substituted piperazinyl group; a -C(=O)-alkyl substituted piperazinyl group such as, 30 but not limited to, a -C(=O)-ethyl or a -C(=O)-methyl substituted piperazinyl

WO 03/004488

PCT/US02/20844

-26-

group, and the like such as a piperazinyl group where the -C(=O)-ethyl or the -C(=O)-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z², and the like; a -C(=O)-O-alkyl substituted piperazinyl group such as, but not limited to, a -C(=O)-O-ethyl or a -C(=O)-O-methyl substituted

5 piperazinyl group, and the like such as a piperazinyl group where the -C(=O)-O-ethyl or the -C(=O)-O-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z², and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted

10 piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a

15 hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not

20 limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl

25 group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group

30 such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as,

WO 03/004488

PCT/US02/20844

-27-

but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the

5 like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-

10 diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-

15 diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the third group of compounds where R⁶ is a substituted or unsubstituted heterocyclyl group, R⁷ is -H.

20 In another embodiment of the third group of compounds, Z¹, Z², Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and R⁷ is a substituted or unsubstituted heterocyclyl group. In some embodiments of the third group of compounds where R⁷ is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and

25 unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and

30 unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-

WO 03/004488

PCT/US02/20844

-28-

diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the third group of

5 compounds where R⁷ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an

10 aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the

ring O atom with a dimethylaminomethyl group and is substituted with a methyl

15 group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group

20 and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl

25 group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-,

30 and 4-pyridyl) substituted piperazinyl groups and the like; a -CH₂C(=O)O-alkyl

WO 03/004488

PCT/US02/20844

-29-

substituted piperazinyl group; a $-C(=O)$ -alkyl substituted piperazinyl group such as, but not limited to, a $-C(=O)$ -ethyl or a $-C(=O)$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-C(=O)$ -ethyl or the $-C(=O)$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a $-C(=O)O$ -alkyl substituted piperazinyl group such as, but not limited to, a $-C(=O)O$ -ethyl or a $-C(=O)O$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-C(=O)O$ -ethyl or the $-C(=O)O$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted

WO 03/004488

PCT/US02/20844

-30-

pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted

5 pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy

10 substituted pyrrolidinyl groups; a heterocyclylalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or

15 unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In

20 still other embodiments of the third group of compounds where R^7 is a substituted or unsubstituted heterocyclyl group, R^6 is -H.

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a fourth group of compounds for which:

25 Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-31-

- unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
- 5 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, and substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups,
- 10 substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
- 15 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted
- 20 heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-
- 25 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

- R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -
- 30 C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,

WO 03/004488

PCT/US02/20844

-32-

substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted akoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,

WO 03/004488

PCT/US02/20844

-33-

- substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
- 5 C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;
- R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted
- 10 and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy group, substituted and unsubstituted heterocycl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted
- 15 -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
- 20 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
- 25 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
- 30 groups;

WO 03/004488

PCT/US02/20844

-34-

R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

WO 03/004488

PCT/US02/20844

-35-

R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-36-

arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted

5 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted

10 $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups; or R^7 is absent if Z^3 is N;

R^8 is selected from $-H$, $-F$, $-Cl$, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted

15 amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^8 is absent if Z^4 is N;

R^9 is $-H$; and

R^{10} is selected from the group consisting of $-H$, and substituted and

20 unsubstituted alkyl groups. In some such embodiments of the fourth group of compounds, at least one of R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 or R^8 is not $-H$. In other such embodiments, at least two of R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 or R^8 are not $-H$.

In some embodiments of the fourth group of compounds, R^1 is an unsubstituted $-NH_2$ group or is a substituted or unsubstituted heterocyclylamino

25 group such as, but not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups and the like, such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylamino groups and the like such as, but not limited to, $-N(H)-CH_2-(2\text{-pyrrolidinyl})$ groups and the like.

WO 03/004488

PCT/US02/20844

-37-

In another embodiment of the fourth group of compounds, R^2 is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and unsubstituted pyrrolidinylalkylamino groups, and substituted and unsubstituted aminoalkylamino groups. In other such

5 embodiments, R^2 is selected from the group consisting of $-N(H)-CH_2-(2\text{-thiazolyl})$ groups, $-N(H)-CH_2-(2\text{-pyrrolidinyl})$ groups, $-N(H)-CH_2CH_2CH_2-N(H)(\text{alkyl})$ groups, and $-NH-CH_2CH_2CH_2-N(\text{alkyl})_2$ groups. In still other such embodiments, R^2 is selected from the group consisting of $-N(H)-CH_2-(2\text{-thiazolyl})$ groups, $-N(H)-CH_2-$

10 (2-pyrrolidinyl) groups, $-N(H)-CH_2CH_2CH_2-N(H)(CH_3)$ groups, and $-NH-CH_2CH_2CH_2-N(CH_3)_2$ groups.

In another embodiment of the fourth group of compounds, Z^1-Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of $-F$, $-Cl$, $-Br$, $-CF_3$, $-C\equiv N$, $-NO_2$, $-CO_2H$, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted

15 and unsubstituted alkoxy groups, substituted and unsubstituted $-N(H)C(=O)N(H)-\text{alkyl}$ groups, substituted and unsubstituted $-N(H)C(=O)N(H)-\text{aryl}$ groups and substituted and unsubstituted $-C(=O)N(H)-\text{alkyl-heterocyclyl}$ groups; or R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

20 In another embodiment of the fourth group of compounds, Z^1-Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of substituted and unsubstituted $-N(H)C(=O)N(H)-\text{alkyl}$ groups, and substituted and unsubstituted $-N(H)C(=O)N(H)-\text{aryl}$ groups. In some such embodiments, R^3 is a substituted or unsubstituted $-N(H)C(=O)N(H)CH_2CH_3$ group,

25 a substituted or unsubstituted $-N(H)C(=O)N(H)CH(CH_3)_2$ group, a substituted or unsubstituted $-N(H)C(=O)N(H)C(CH_3)_3$ group, or a substituted or unsubstituted $-N(H)C(=O)N(H)-\text{aryl}$ group or the like. In some such embodiments, R^3 is a substituted or unsubstituted $-N(H)C(=O)N(H)-\text{aryl}$ group such as, but not limited

WO 03/004488

PCT/US02/20844

-38-

to, a -N(H)C(=O)N(H)-(2-methoxyphenyl) group,
a-N(H)C(=O)N(H)-(trifluoromethylphenyl) group, or the like.

In other embodiments of the fourth group of compounds, R³ is selected from the group consisting of substituted and unsubstituted

5 thiazolylalkylamino groups, substituted and unsubstituted benzimidazolylalkylamino groups, substituted and unsubstituted imidazolylalkylamino groups, substituted and unsubstituted furanylalkylamino groups, and substituted and unsubstituted arylalkylamino groups. In some such embodiments, R³ is selected from the group consisting of (2-thiazolyl)alkylamino groups, 1-(3-methylbenzimidazolyl)alkylamino

10 groups, 4-(2-phenylimidazolyl)alkylamino groups, 4-(2-ethyl-5-methylimidazolyl)alkylamino groups, (2-furanyl)alkylamino groups, phenylalkylamino groups, and 1-(2-fluoro-5-alkoxyphenyl)alkylamino groups. In still other such embodiments, R³ is selected from the group consisting of -N(H)-CH₂-(2-thiazolyl) groups, -N(H)-CH₂-(1-(3-methylbenzimidazolyl)) groups, -

15 N(H)-CH₂-(4-(2-phenylimidazolyl)) groups, -N(H)-CH₂-(4-(2-ethyl-5-methylimidazolyl)) groups, -N(H)-CH₂-(2-furanyl) groups, -N(H)-CH₂-phenyl groups, and -N(H)-CH₂-(1-(2-fluoro-5-alkoxyphenyl)) groups.

In still another embodiment, R¹ is selected from the group consisting of unsubstituted -NH₂ groups, and substituted and unsubstituted

20 pyrrolidinylalkylamino groups; R² is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and unsubstituted pyrrolidinylalkylamino groups, and substituted and unsubstituted aminoalkylamino groups; and/or R³ is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and

25 unsubstituted benzimidazolylalkylamino groups, substituted and unsubstituted imidazolylalkylamino groups, substituted and unsubstituted furanylalkylamino groups, and substituted and unsubstituted arylalkylamino groups. In such compounds, Z¹-Z⁴, R⁴, R⁵, R⁶, R⁷, R⁸, R⁹, and R¹⁰ can have any of the other values described in any of the other embodiments of any of the groups of compounds.

WO 03/004488

PCT/US02/20844

-39-

- In another embodiment of the fourth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from a first group; or Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from the first group,
- 5 the first group comprising members selected from the group consisting of -Br, -CO₂H, substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclheterocycl groups, substituted and unsubstituted arylheterocycl groups, substituted and unsubstituted
- 10 cycloalkylheterocycl groups, substituted and unsubstituted heterocyclloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted (alkyl)(heterocycl)amino groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups, substituted and unsubstituted heterocyclamino groups, substituted and
- 15 unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocycl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocycl) groups, and substituted and unsubstituted -C(=O)-heterocycl groups. In some such embodiments, R^3 is selected from the group consisting of -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and
- 20 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, and substituted and unsubstituted -C(=O)N(H)-alkyl-heterocycl groups; or R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

- Other more particular embodiments of the compounds of the
- 25 invention having the general structure shown in I above are provided. Such compounds form a fifth group of compounds for which:

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and

WO 03/004488

PCT/US02/20844

-40-

unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, and substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino

WO 03/004488

PCT/US02/20844

-41-

- groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
- 5 -C(=O)-N(H)-alkyl-heterocyclyl groups substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups,
- 10 substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
- 15 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy, substituted and unsubstituted heterocyclylalkoxy groups, substituted and
- 20 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
- 25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
- 30 unsubstituted arylaminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-42-

heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
5 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;

R³ is selected from -F, -Cl, -Br, -CF₃, -C≡N, substituted and
10 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted saturated heterocycl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl
15 groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups;

20 R⁴ is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
25 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted

WO 03/004488

PCT/US02/20844

-43-

- and unsubstituted alkoxy groups substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
- 5 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
- 10 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
- 15 groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
- 20 C(=O)-alkyl-heterocyclyl groups;

- R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
- 25 groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy

WO 03/004488

PCT/US02/20844

-44-

- groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
- 5 unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted
- 10 heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups; or R^6 is absent if Z^2 is N;
- 15 R^7 is selected from $-H$, $-F$, $-Cl$, $-Br$, $-CF_3$, $-CO_2H$, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and
- 20 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted
- 25 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted
- 30 $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-45-

-C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁸ is absent if Z⁴ is N;

R⁹ is -H; and

R¹⁰ is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups.

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a sixth group of compounds for which:

Z¹, Z², Z³, and Z⁴ are independently selected from C or N;

R¹ is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups,

WO 03/004488

PCT/US02/20844

-46-

substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted

5 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and

10 unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted

15 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R^2 is selected from -F, -Cl, -Br, -C \equiv N, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted -C(=O)O-alkyl

20 groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted

25 -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,

30 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl

WO 03/004488

PCT/US02/20844

-47-

groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted heterocyclyloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a
 5 fused 5-membered ring that includes 2 oxygen atoms;

R^3 is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
 10 and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy group, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
 15 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)NH-alkyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl-
 20 heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
 25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
 30 unsubstituted arylaminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-48-

- heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
- 5 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
- 10 heterocycliloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
- 15 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
- 20 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
- 25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
- 30 unsubstituted arylaminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-49-

heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
5 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
10 amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
15 substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
20 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
25 unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-50-

-C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
5 substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
10 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and
15 unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-
20 heterocyclyl groups; or R⁷ is absent if Z³ is N;

R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
25 groups, or R⁸ is absent if Z⁴ is N;

R⁹ is -H; and

R¹⁰ is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups.

WO 03/004488

PCT/US02/20844

-51-

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a seventh group of compounds for which:

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

- 5 R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
- 10 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
- 15 groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
- 20 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
- 25 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,

WO 03/004488

PCT/US02/20844

-52-

substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups, substituted and unsubstituted -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-53-

(alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
 heterocyclalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
 5 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclalkyl
 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
 unsubstituted arylaminoalkyl groups, substituted and unsubstituted
 heterocyclalkylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
 groups, substituted and unsubstituted heterocyclalkylaminoalkyl groups,
 10 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and
 unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
 -alkyl-N(H)-C(=O)-heterocyclalkyl groups, substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-heterocyclalkyl groups; or R² and R³ are a group of formula -OCH₂O-
 15 such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;

R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H,
 substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
 -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
 20 and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted alkoxyalkyl
 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
 unsubstituted aryloxy group, substituted and unsubstituted heterocyclalkyl groups,
 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
 unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
 25 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclalkyl
 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-
 30 heterocyclalkyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups,

WO 03/004488

PCT/US02/20844

-54-

substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted

5 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and

10 unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted

15 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted

20 heterocyclioxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,

25 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,

30 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-55-

- unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
- 5 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
- 10 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

- R^5 is selected from -H, -F, -Cl, substituted¹ and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^5 is absent if Z^1 is N;
- 20

- R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
- 25

WO 03/004488

PCT/US02/20844

-56-

substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

WO 03/004488

PCT/US02/20844

-57-

R^8 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocycl
5 groups, or R^8 is absent if Z^4 is N;

R^9 is -H;

R^{10} is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups; and

at least one of Z^2 or Z^3 is C and at least one of R^6 or R^7 is selected
10 from the group consisting of substituted and unsubstituted piperidinyl substituted heterocycl groups, substituted and unsubstituted heterocycl substituted piperidinyl groups, substituted and unsubstituted hydroxymethyl substituted piperidinyl groups, dimethylaminoalkyl substituted pyrrolidinyl groups, substituted and unsubstituted 3-alkyl substituted piperazinyl groups, substituted and
15 unsubstituted 3,5-dialkyl substituted piperazinyl groups, substituted and unsubstituted N-hydroxyalkyl substituted piperazinyl groups, substituted and unsubstituted 1,4-diazacycloheptyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptyl groups, substituted and unsubstituted N-ethylpiperazinyl groups, substituted and unsubstituted N-isopropylpiperazinyl groups, substituted and
20 unsubstituted N-sec-butylpiperazinyl groups, substituted and unsubstituted N-2-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-3-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-4-pyridyl substituted piperazinyl groups, substituted and unsubstituted N(H)-CH₂-pyridyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 3-
25 alkyl substituted morpholinyl groups, substituted and unsubstituted 3,5-dialkyl substituted morpholinyl groups, dialkylamino substituted pyrrolidinyl groups, pyrrolidinyl groups substituted with both dialkylamino and alkyl groups, substituted and unsubstituted 4-hydroxy substituted piperidinyl groups, substituted and unsubstituted 4-aryl substituted piperidinyl groups, substituted and unsubstituted 4-

WO 03/004488

PCT/US02/20844

-58-

hydroxy-4-phenyl substituted piperidinyl groups, substituted and unsubstituted cyclohexylpiperazinyl groups, substituted and unsubstituted cyclopentylpiperazinyl groups, substituted and unsubstituted N-alkyl substituted diazabicycloalkane groups, substituted and unsubstituted -N(CH₃)(N-alkyl(4-piperidinyl)) groups, substituted and unsubstituted piperazinyl groups further substituted with a -C(=O)-alkyl group on one of the N atoms of the piperazinyl group, substituted and unsubstituted -N(H)CH₂CH₂CH₂-imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyridyl groups, substituted and unsubstituted -N(H)CH₂CH₂-imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyridyl groups, substituted and unsubstituted cyclobutylpiperazinyl groups, substituted and unsubstituted -OCH₂-pyrrolidinyl groups, substituted and unsubstituted -OCH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -OCH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted piperazinyl groups further substituted with a -CH₂C(=O)-O-alkyl group bonded to one of the N atoms of the piperazinyl group, substituted and unsubstituted piperazinyl groups further substituted with a -C(=O)-O-alkyl group bonded to one of the N atoms of the piperazinyl group, substituted and unsubstituted hydroxypyrrolidinyl groups, substituted and unsubstituted hydroxypiperidinyl groups, substituted and unsubstituted -OCH₂-pyridyl groups, substituted and unsubstituted piperidinylamino groups, substituted and unsubstituted pyridyloxy groups with a -C(=O)-N(H)(alkyl) group bonded to a carbon atom of the pyridine ring of the pyridyloxy group, and substituted and unsubstituted pyridyloxy groups with a -C(=O)-N(alkyl)₂ group bonded to a carbon atom of the pyridine ring of the pyridyloxy group.

WO 03/004488

PCT/US02/20844

-59-

The invention further provides many other embodiments of compounds having the formula I and embodiments of the first, second, third, fourth, fifth, sixth, and seventh groups of compounds having the formula I.

5 Pharmaceutical formulations according to the present invention are provided which include any of the compounds described above in combination with a pharmaceutically acceptable carrier.

The invention further provides methods for synthesizing the compounds of formula I according to the first through seventh groups.

10 A method of treating a patient is also provided which includes administering an effective amount of the pharmaceutical formulation according to the present invention to a patient in need thereof.

A method for inhibiting tumor growth in a patient is provided and includes administering an effective amount of a compound according to the invention to a patient having a tumor.

15 A method for inhibiting the proliferation of capillaries in a patient in need is still further provided and includes administering an effective amount of a compound according to the present invention to a patient in need.

Various other methods for inhibiting enzymes and treating patients and cells are further disclosed in the following detailed description.

20 Further objects, features and advantages of the invention will be apparent from the following detailed description.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a novel class of compounds which act as inhibitors of receptor tyrosine kinases, including inhibitors of bFGF, VEGF-
25 RTK, KDR, Flk-1, GSK-3, NEK-2, CHK-1, Tie-2, PDGF, and cdc 2. These

WO 03/004488

PCT/US02/20844

-60-

compounds can be formulated into pharmaceutical formulations that are useful in treating patients with a need for such inhibitors (e.g., those suffering from cancer). The compounds described herein are also useful for reducing capillary proliferation and in the treatment of cancer and other medical or cellular conditions in human and

5 cell subjects.

The following abbreviations and definitions are used throughout this application:

“VEGF” is an abbreviation that stands for vascular endothelial growth factor.

10 “RTK” is an abbreviation that stands for receptor tyrosine kinase.

“VEGF-RTK” is an abbreviation that stands for vascular endothelial growth factor receptor tyrosine kinase.

“Flt-1” is an abbreviation that stands for fms-like tyrosine kinase-1, also known as vascular endothelial growth factor receptor-1 or VEGFR1.

15 “KDR” is an abbreviation that stands for kinase-insert domain tyrosine kinase, also known as vascular endothelial growth factor receptor-2 or VEGFR2.

“bFGF” is an abbreviation that stands for basic fibroblast growth factor.

20 “bFGFR” is an abbreviation that stands for basic fibroblast growth factor receptor.

“GSK-3” is an abbreviation that stands for glycogen synthase kinase

3.

“NEK-2” is an abbreviation that stands for NIM-A related kinase.

WO 03/004488

PCT/US02/20844

-61-

“NIM-A” is an abbreviation that stands for never in mitosis.

“CHK 1” is an abbreviation that stands for checkpoint kinase 1.

“Cdc 2” is an abbreviation that stands for cell division cycle 2.

5 “Tie-2” is an abbreviation that stands for tyrosine kinase with Ig and EGF homology domains.

“PDGF” is an abbreviation that stands for platelet derived growth factor.

“Flk-1” is an abbreviation that stands for fetal liver tyrosine kinase 1.

“AD” is an abbreviation that stands for Alzheimer Disease.

10 “APP” is an abbreviation that stands for amyloid precursor protein.

“PHF” is an abbreviation that stands for paired helical filaments.

“PS 1” is an abbreviation that stands for presenellin 1.

“MS” is an abbreviation that stands for multiple sclerosis.

15 “AML” is an abbreviation that stands for amyotropic lateral sclerosis.

Generally, reference to a certain element such as hydrogen or H is meant to include all isotopes of that element. For example, if an R group is defined to include hydrogen or H, it also includes deuterium and tritium.

20 The phrase “unsubstituted alkyl” refers to alkyl groups that do not contain heteroatoms. Thus the phrase includes straight chain alkyl groups such as methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl and the like. The phrase also includes branched chain isomers of straight chain alkyl groups, including but not limited to, the following which are provided

WO 03/004488

PCT/US02/20844

-62-

by way of example: $-\text{CH}(\text{CH}_3)_2$,
 $-\text{CH}(\text{CH}_3)(\text{CH}_2\text{CH}_3)$, $-\text{CH}(\text{CH}_2\text{CH}_3)_2$, $-\text{C}(\text{CH}_3)_3$, $-\text{C}(\text{CH}_2\text{CH}_3)_3$,
 $-\text{CH}_2\text{CH}(\text{CH}_3)_2$, $-\text{CH}_2\text{CH}(\text{CH}_3)(\text{CH}_2\text{CH}_3)$, $-\text{CH}_2\text{CH}(\text{CH}_2\text{CH}_3)_2$, $-\text{CH}_2\text{C}(\text{CH}_3)_3$, $-\text{CH}_2\text{C}(\text{CH}_2\text{CH}_3)_3$,
 $-\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)(\text{CH}_2\text{CH}_3)$, $-\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)_2$,
5 $-\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)(\text{CH}_2\text{CH}_3)$, $-\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_2\text{CH}_3)_2$, $-\text{CH}_2\text{CH}_2\text{C}(\text{CH}_3)_3$,
 $-\text{CH}_2\text{CH}_2\text{C}(\text{CH}_2\text{CH}_3)_3$, $-\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}(\text{CH}_3)_2$,
 $-\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)_2$, $-\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)(\text{CH}_2\text{CH}_3)$, and
others. The phrase also includes cyclic alkyl groups such as cyclopropyl,
cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl, and cyclooctyl and such rings
10 substituted with straight and branched chain alkyl groups as defined above. Thus
the phrase unsubstituted alkyl groups includes primary alkyl groups, secondary alkyl
groups, and tertiary alkyl groups. Unsubstituted alkyl groups may be bonded to one
or more carbon atom(s), oxygen atom(s), and/or nitrogen atom(s) in the parent
compound. Preferred unsubstituted alkyl groups include straight and branched chain
15 alkyl groups and cyclic alkyl groups having 1 to 20 carbon atoms. More preferred
such unsubstituted alkyl groups have from 1 to 10 carbon atoms while even more
preferred such groups have from 1 to 8, from 1 to 6 or from 1 to 4 carbon atoms.
Other preferred unsubstituted alkyl groups include straight and branched chain alkyl
groups having from 1 to 3 carbon atoms and include methyl, ethyl, propyl, and –
20 $\text{CH}(\text{CH}_3)_2$.

The phrase “substituted alkyl” refers to an unsubstituted alkyl group
as defined above in which one or more bonds to a carbon(s) or hydrogen(s) are
replaced by a bond to non-hydrogen and non-carbon atoms such as, but not limited
to, a halogen atom such as F, Cl, Br, and I; an oxygen atom in groups such as
25 hydroxyl groups, alkoxy groups, aryloxy groups, and ester groups; a sulfur atom in
groups such as thiol groups, alkyl and aryl sulfide groups; sulfone groups, sulfonyl
groups, and sulfoxide groups; a nitrogen atom in groups such as amines, amides,
alkylamines, dialkylamines, arylamines, alkylarylamines, diarylamines, N-oxides,
imides, and enamines; a silicon atom in groups such as in trialkylsilyl groups,
30 dialkylarylsilyl groups, alkylarylsilyl groups, and triarylsilyl groups; and other

WO 03/004488

PCT/US02/20844

-63-

- heteroatoms in various other groups. Substituted alkyl groups also include groups in which one or more bonds to a carbon(s) or hydrogen(s) atom is replaced by a higher-order bond (e.g., a double- or triple-bond) to a heteroatom such as oxygen in oxo, carbonyl, carboxyl, and ester groups; nitrogen in groups such as imines,
- 5 oximes, hydrazones, and nitriles. Substituted alkyl groups further include alkyl groups in which one or more bonds to a carbon(s) or hydrogen(s) atoms is replaced by a bond to an aryl, heterocyclyl group, or cycloalkyl group. Preferred substituted alkyl groups include, among others, alkyl groups in which one or more bonds to a carbon or hydrogen atom is/are replaced by one or more bonds to fluorine atoms.
- 10 Another preferred substituted alkyl group is the trifluoromethyl group and other alkyl groups that contain the trifluoromethyl group. Other preferred substituted alkyl groups include those in which one or more bonds to a carbon or hydrogen atom is replaced by a bond to an oxygen atom such that the substituted alkyl group contains a hydroxyl, alkoxy, or aryloxy group. Still other preferred substituted
- 15 alkyl groups include alkyl groups that have an amine, or a substituted or unsubstituted alkylamine, dialkylamine, arylamine, (alkyl)(aryl)amine, diarylamine, heterocyclamine, diheterocyclamine, (alkyl)(heterocyclyl)amine, or (aryl)(heterocyclyl)amine group.

- The phrase "unsubstituted aryl" refers to aryl groups that do not
- 20 contain heteroatoms. Thus the phrase includes, but is not limited to, groups such as phenyl, biphenyl, anthracenyl, naphthenyl by way of example. Although the phrase "unsubstituted aryl" includes groups containing condensed rings such as naphthalene, it does not include aryl groups that have other groups such as alkyl or halo groups bonded to one of the ring members as aryl groups such as tolyl are
- 25 substituted aryl groups. A preferred unsubstituted aryl group is phenyl. Unsubstituted aryl groups may be bonded to one or more carbon atom(s), oxygen atom(s), and/or nitrogen atom(s) in the parent compound.

The phrase "substituted aryl group" has the same meaning with respect to unsubstituted aryl groups that substituted alkyl groups had with respect to

WO 03/004488

PCT/US02/20844

-64-

unsubstituted alkyl groups. A substituted aryl group includes aryl groups in which one of the aromatic carbons is bonded to a non-carbon or non-hydrogen atom and also includes aryl groups in which one or more aromatic carbons of the aryl group is bonded to a substituted and/or unsubstituted alkyl group. Thus, the phrase

5 “substituted aryl” includes, but is not limited to tolyl, and hydroxyphenyl among others.

The phrase “unsubstituted arylalkyl” refers to unsubstituted alkyl groups as defined above in which a hydrogen or carbon bond of the unsubstituted alkyl group is replaced with a bond to an aryl group as defined above. For

10 example, methyl ($-\text{CH}_3$) is an unsubstituted alkyl group. If a hydrogen atom of the methyl group is replaced by a bond to a phenyl group, such as if the carbon of the methyl were bonded to a carbon of benzene, then the compound is an unsubstituted arylalkyl group. Thus the phrase includes, but is not limited to, groups such as benzyl, diphenylmethyl,

15 $-\text{CH}(\text{C}_6\text{H}_5)(\text{CH}_3)$, and $-\text{CH}_2\text{CH}_2(\text{C}_6\text{H}_5)$ among others.

The phrase “substituted arylalkyl” has the same meaning with respect to unsubstituted arylalkyl groups that substituted aryl groups had with respect to unsubstituted aryl groups. However, a substituted arylalkyl group also includes groups in which a carbon or hydrogen bond of the alkyl part of the group is

20 replaced by a bond to a non-carbon or a non-hydrogen atom. Examples of substituted arylalkyl groups include, but are not limited to, $-\text{CH}_2\text{C}(=\text{O})(\text{C}_6\text{H}_5)$, and $-\text{CH}_2(2\text{-methylphenyl})$ among others.

The phrase “unsubstituted heterocyclyl” refers to both aromatic and nonaromatic ring compounds containing 3 or more ring members of which one or

25 more is a heteroatom such as, but not limited to, N, O, and S. Although the phrase “unsubstituted heterocyclyl” includes condensed heterocyclic rings such as benzimidazolyl and indazolyl, it does not include heterocyclyl groups that have other groups such as alkyl or halo groups bonded to one of the ring members because compounds such as 2-methylbenzimidazolyl are substituted heterocyclyl groups.

WO 03/004488

PCT/US02/20844

-65-

Examples of heterocyclyl groups include, but are not limited to: unsaturated 3 to 8 membered rings containing 1 to 4 nitrogen atoms such as, but not limited to pyrrolyl, pyrrolinyl, imidazolyl, pyrazolyl, pyridyl, dihydropyridyl, pyrimidyl, pyrazinyl, pyridazinyl, triazolyl (e.g. 4H-1,2,4-triazolyl, 1H-1,2,3-triazolyl, 2H-1,2,3-triazolyl etc.), tetrazolyl, (e.g. 1H-tetrazolyl, 2H-tetrazolyl, etc.); saturated 3 to 8 membered rings containing 1 to 4 nitrogen atoms such as, but not limited to, pyrrolidinyl, imidazolidinyl, piperidinyl, piperazinyl; condensed unsaturated heterocyclic groups containing 1 to 4 nitrogen atoms such as, but not limited to, indolyl, isoindolyl, indolinyl, indolizinyl, benzimidazolyl, quinolyl, isoquinolyl, indazolyl, benzotriazolyl; unsaturated 3 to 8 membered rings containing 1 to 2 oxygen atoms and 1 to 3 nitrogen atoms such as, but not limited to, oxazolyl, isoxazolyl, oxadiazolyl (e.g. 1,2,4-oxadiazolyl, 1,3,4-oxadiazolyl, 1,2,5-oxadiazolyl, etc.); saturated 3 to 8 membered rings containing 1 to 2 oxygen atoms and 1 to 3 nitrogen atoms such as, but not limited to, morpholinyl; unsaturated condensed heterocyclic groups containing 1 to 2 oxygen atoms and 1 to 3 nitrogen atoms, for example, benzoxazolyl, benzoxadiazolyl, benzoxazinyl (e.g. 2H-1,4-benzoxazinyl etc.); unsaturated 3 to 8 membered rings containing 1 to 3 sulfur atoms and 1 to 3 nitrogen atoms such as, but not limited to, thiazolyl, isothiazolyl, thiadiazolyl (e.g. 1,2,3-thiadiazolyl, 1,2,4-thiadiazolyl, 1,3,4-thiadiazolyl, 1,2,5-thiadiazolyl, etc.); saturated 3 to 8 membered rings containing 1 to 2 sulfur atoms and 1 to 3 nitrogen atoms such as, but not limited to, thiazolodinyl; saturated and unsaturated 3 to 8 membered rings containing 1 to 2 sulfur atoms such as, but not limited to, thienyl, dihydrodithiyl, dihydrodithionyl, tetrahydrothiophene, tetrahydrothiopyran; unsaturated condensed heterocyclic rings containing 1 to 2 sulfur atoms and 1 to 3 nitrogen atoms such as, but not limited to, benzothiazolyl, benzothiadiazolyl, benzothiazinyl (e.g. 2H-1,4-benzothiazinyl, etc.), dihydrobenzothiazinyl (e.g. 2H-3,4-dihydrobenzothiazinyl, etc.), unsaturated 3 to 8 membered rings containing oxygen atoms such as, but not limited to furanyl (the furan group); unsaturated condensed heterocyclic rings containing 1 to 2 oxygen atoms such as benzodioxolyl (e.g. 1,3-benzodioxolyl, etc.); unsaturated 3 to 8

WO 03/004488

PCT/US02/20844

-66-

membered rings containing an oxygen atom and 1 to 2 sulfur atoms such as, but not limited to, dihydrooxathiinyl; saturated 3 to 8 membered rings containing 1 to 2 oxygen atoms and 1 to 2 sulfur atoms such as 1,4-oxathiane; unsaturated condensed rings containing 1 to 2 sulfur atoms such as benzothienyl, benzodithiinyl; and

5 unsaturated condensed heterocyclic rings containing an oxygen atom and 1 to 2 oxygen atoms such as benzoxathiinyl. Heterocyclyl group also include those described above in which one or more S atoms in the ring is double bonded to one or two oxygen atoms (sulfoxides and sulfones). For example, heterocyclyl groups include tetrahydrothiophene, tetrahydrothiophene oxide, and tetrahydrothiophene

10 1,1-dioxide. Preferred heterocyclyl groups contain 5 or 6 ring members. More preferred heterocyclyl groups include morpholine, piperazine, piperidine, pyrrolidine, pyridine, 2,5-diazabicyclo[2.2.1]heptane, 1,4-diazacycloheptane, imidazole, pyrazole, 1,2,3-triazole, 1,2,4-triazole, tetrazole, thiomorpholine, pyrrole, homopiperazine, oxazolidin-2-one, pyrrolidin-2-one, oxazole, thiazole,

15 isoxazole, furan, and tetrahydrofuran.

The phrase "substituted heterocyclyl" refers to an unsubstituted heterocyclyl group as defined above in which one of the ring members is bonded to a non-hydrogen atom such as described above with respect to substituted alkyl groups and substituted aryl groups. Examples, include, but are not limited to, 2-

20 methylbenzimidazolyl, 5-methylbenzimidazolyl, 5-chlorobenzthiazolyl, 1-methyl piperazinyl, 1-ethylpiperazinyl, 1-isopropylpiperazinyl, 4-(piperidinyl)piperidinyl, 2,6-dimethylpiperazinyl, 3,5-dimethylpiperazinyl, 2,6-dimethylmorpholinyl, dimethyl[(5-methylmorpholin-2-yl)methyl]amine, dimethyl(morpholin-2-ylmethyl)amine, 5-methyl-2-(dimethylaminomethyl)-1-oxa-4-azacycloheptyl, 1-

25 methyl-1,4-diazabicycloheptane, hydroxyalkylpiperazinyl, dialkylaminopyrrolidinyl, alkylpyrrolidinyl, and 2-chloropyridyl among others.

The phrase "unsubstituted heteroaryl" refers to an unsubstituted heterocyclyl group as defined above which is aromatic. Pyridine is just one example of such a group.

WO 03/004488

PCT/US02/20844

-67-

The phrase "substituted heteroaryl" refers to an unsubstituted heteroaryl group as defined above in which a ring member of the heteroaryl group is bonded to a non-hydrogen atom.

The phrase "unsubstituted arylheterocyclyl" refers to heterocyclyl groups as defined above in which a ring member of a heterocyclyl group is bonded to an otherwise unsubstituted aryl group as defined above. For example, piperazine is a heterocyclyl group. If a nitrogen or carbon atom of the piperazinyl group is bonded to an unsubstituted aryl group, then the compound is an unsubstituted arylheterocyclyl group if the heterocyclyl group is also unsubstituted save for its point of attachment to the parent compound.

The phrase "substituted arylheterocyclyl" refers to heterocyclyl groups as defined above in which a ring member of a heterocyclyl group is bonded to an aryl group as defined above. For example, piperazine is a heterocyclyl group. If a nitrogen or carbon atom of the piperazinyl group is bonded to an aryl group, then the compound is a substituted arylheterocyclyl group if the aryl group is otherwise substituted and/or the heterocyclyl group is also substituted in addition to its point of attachment to the parent compound.

The phrase "unsubstituted cycloalkylheterocyclyl" refers to heterocyclyl groups as defined above in which a ring member of a heterocyclyl group is bonded to an otherwise unsubstituted cycloalkyl group. For example, piperazine is a heterocyclyl group. If a nitrogen or carbon atom of the piperazinyl group is bonded to an unsubstituted cycloalkyl group, then the compound is an unsubstituted cycloalkylheterocyclyl group if the heterocyclyl group is also unsubstituted save for its point of attachment to the parent compound. Unsubstituted cycloalkylheterocyclyl groups include, but are not limited to N-cyclohexylpiperazinyl groups, 4-(cyclohexyl)piperidinyl groups, 4-cyclopentylpiperidinyl groups, and the like.

WO 03/004488

PCT/US02/20844

-68-

The phrase "substituted cycloalkylheterocyclyl" refers to heterocyclyl groups as defined above in which a ring member of a heterocyclyl group is bonded to a cycloalkyl group as defined above. For example, piperazine is a heterocyclyl group. If a nitrogen or carbon atom of the piperazinyl group is bonded to a
5 cycloalkyl group, then the compound is a substituted cycloalkylheterocyclyl group if the cycloalkyl group is otherwise substituted and/or the heterocyclyl group is also substituted in addition to its point of attachment to the parent compound.

The phrase "unsubstituted heterocyclylheterocyclyl" refers to heterocyclyl groups as defined above in which a ring member of a first heterocyclyl
10 group is bonded to a second otherwise unsubstituted heterocyclyl group as defined above. For example, piperazine is a heterocyclyl group. If a nitrogen or carbon atom of the piperazinyl group is bonded to a second unsubstituted heterocyclyl group, then the compound is an unsubstituted heterocyclylheterocyclyl group if the first heterocyclyl group is otherwise unsubstituted save for its point of attachment to
15 the parent compound. Unsubstituted heterocyclylheterocyclyl groups include, among others piperidinylpiperidinyl groups and the like such as, but not limited to, 4-(piperidinyl)piperidinyl.

The phrase "substituted heterocyclylheterocyclyl" refers to heterocyclyl groups as defined above in which a ring member of a first heterocyclyl
20 group is bonded to a second heterocyclyl group as defined above. For example, piperazine is a heterocyclyl group. If a nitrogen or carbon atom of the piperazinyl group is bonded to a second heterocyclyl group, then the compound is a substituted heterocyclylheterocyclyl group if the second heterocyclyl group is otherwise substituted and/or the first heterocyclyl group is also substituted in addition to its
25 point of attachment to the parent compound.

The phrase "unsubstituted heterocyclylalkyl" refers to unsubstituted alkyl groups as defined above in which a hydrogen or carbon bond of the unsubstituted alkyl group is replaced with a bond to a an otherwise unsubstituted heterocyclyl group as defined above. For example, methyl

WO 03/004488

PCT/US02/20844

-69-

(-CH₃) is an unsubstituted alkyl group. If a hydrogen atom of the methyl group is replaced by a bond to an unsubstituted heterocyclyl group, such as if the carbon of the methyl were bonded to carbon 2 of pyridine (one of the carbons bonded to the N of the pyridine) or carbons 3 or 4 of the pyridine, then the compound is an

5 unsubstituted heterocyclylalkyl group.

The phrase "substituted heterocyclylalkyl" has the same meaning with respect to unsubstituted heterocyclylalkyl groups that substituted arylalkyl groups had with respect to unsubstituted arylalkyl groups. However, a substituted heterocyclylalkyl group also includes groups in which a non-hydrogen atom is

10 bonded to a heteroatom in the heterocyclyl group of the heterocyclylalkyl group such as, but not limited to, a nitrogen atom in the piperidine ring of a piperidinylalkyl group.

The phrase "unsubstituted alkoxy" refers to an -O-alkyl group where the alkyl group is otherwise unsubstituted. Examples of unsubstituted alkoxy groups

15 include, but are not limited to methoxy, ethoxy, n-propoxy, i-propoxy, and n-butoxy groups.

The phrase "substituted alkoxy" refers to an -O-alkyl group where the alkyl group is otherwise substituted.

The phrase "unsubstituted aryloxy" refers to an -O-aryl group where the aryl group is otherwise unsubstituted. Examples of unsubstituted aryloxy groups

20 include, but are not limited to, phenyloxy, and naphthyloxy groups.

The phrase "substituted aryloxy" refers to an -O-aryl group where the aryl group is otherwise substituted. Examples of such groups include 4-chlorophenyloxy and 2-methylphenyloxy groups.

25 The phrase "unsubstituted heterocyclyloxy" refers to an -O-heterocyclyl group where the heterocyclyl group is otherwise unsubstituted.

WO 03/004488

PCT/US02/20844

-70-

The phrase "substituted heterocycloxy" refers to an -O-heterocyclyl group where the heterocyclyl group is otherwise substituted.

The phrase "unsubstituted arylalkoxy" refers to an arylalkyl-O- group where the alkyl group of the arylalkyl group is bonded to the O atom and the
5 arylalkyl group is otherwise unsubstituted.

The phrase "substituted arylalkoxy" refers to an arylalkyl-O- group where the alkyl group of the arylalkyl group is bonded to the O atom and the arylalkyl group is otherwise substituted.

The phrase "unsubstituted heterocyclalkoxy" refers to a
10 heterocyclalkyl-O- group where the alkyl group of the heterocyclalkyl group is bonded to the O atom and the heterocyclalkyl group is otherwise unsubstituted.

The phrase "substituted heterocyclalkoxy" refers to an heterocyclalkyl-O- group where the alkyl group of the heterocyclalkyl group is bonded to the O atom and the heterocyclalkyl group is otherwise substituted.

15 The phrase "unsubstituted alkoxyalkoxy" refers to an -O-alkyl-O-alkyl group where both of the alkyl groups are otherwise unsubstituted.

The phrase "substituted alkoxyalkoxy" refers to an -O-alkyl-O-alkyl group where one or both of the alkyl groups are otherwise substituted.

The phrase "unsubstituted amino" refers to -NH₂.

20 The phrase "substituted amino" refers to an amino group in which one or more bonds to the hydrogen atoms of the amino group are replaced by bonds to non-hydrogen atom. Examples of substituted amino groups include, but are not limited to, substituted and unsubstituted alkylamino groups, heterocyclamino groups, arylamino groups, dialkylamino groups, diheterocyclamino groups,
25 diarylamino groups, (alkyl)(heterocycl)amino groups, (alkyl)(aryl)amino groups, and (heterocycl)(aryl) groups.

WO 03/004488

PCT/US02/20844

-71-

The phrase "unsubstituted alkylamino" refers to an amino group in which one of the bonds to one of the hydrogen atoms in the amino group is replaced with a bond to an otherwise unsubstituted alkyl group as defined above. Examples of unsubstituted alkylamino groups include, but are not limited to, methylamino, ethylamino, i-propylamino, n-propylamino, butylamino, and cyclohexylamino groups.

The phrase "substituted alkylamino" refers to an amino group in which one of the bonds to one of the hydrogen atoms in the amino group is replaced with a bond to an otherwise substituted alkyl group as defined above.

10 The phrase "unsubstituted heterocyclamino" refers to an amino group in which one of the bonds to one of the hydrogen atoms in the amino group is replaced with a bond to an otherwise unsubstituted heterocycl group as defined above.

15 The phrase "substituted heterocyclamino" refers to an amino group in which one of the bonds to one of the hydrogen atoms in the amino group is replaced with a bond to an otherwise substituted heterocycl group as defined above.

20 The phrase "unsubstituted dialkylamino" refers to an amino group in which the bonds to the two hydrogen atoms in the amino group are replaced with bonds to two alkyl groups which may be the same or different and which are otherwise unsubstituted alkyl groups as defined above. Examples of unsubstituted dialkylamino groups include, but are not limited to, dimethylamino groups, (methyl)(ethyl)amino groups, and (methyl)(cyclohexyl)amino groups where the parentheses in groups such as (methyl)(cyclohexyl)amino group indicate that the methyl group is bonded to the nitrogen atom of the amino group and the cyclohexyl group is bonded to the nitrogen atom of the amino group.

The phrase "substituted dialkylamino" refers to an amino group in which the bonds to the two hydrogen atoms in the amino group are replaced with

WO 03/004488

PCT/US02/20844

-72-

bonds to two alkyl groups which may be the same or different. Furthermore, in substituted dialkylamino groups, at least one of two alkyl groups is an otherwise substituted alkyl group as defined above.

The phrase “unsubstituted (alkyl)(heterocyclyl)amino” refers to an amino group in which one of the bonds to one of the hydrogen atoms of the amino group is replaced by a bond to an otherwise unsubstituted alkyl group as defined above and the bond to the other hydrogen atom of the amino group is replaced by a bond to an otherwise unsubstituted heterocyclyl group. Examples of unsubstituted (alkyl)(heterocyclyl)amino groups include, but are not limited to, (methyl)(pyridyl)amino groups, (methyl)(morpholinyl)amino groups, and (methyl)(piperidinyl)amino groups.

The phrase “substituted (alkyl)(heterocyclyl)amino” refers to an amino group in which one of the bonds to one of the hydrogen atoms of the amino group is replaced by a bond to an otherwise substituted or unsubstituted alkyl group as defined above and the bond to the other hydrogen atom of the amino group is replaced by a bond to an otherwise substituted or unsubstituted heterocyclyl group. However, if the bond to one of the hydrogen atoms in the amino group is replaced by a bond to an otherwise unsubstituted alkyl group, then the bond to the other hydrogen atom of the amino group is replaced by a bond to an otherwise substituted heterocyclyl group. The reverse is also true so that the alkyl group and/or the heterocyclyl group is substituted in a substituted (alkyl)(heterocyclyl)amino group.

The phrase “unsubstituted heterocyclylalkylamino” refers to an amino group in which a bond to one of the hydrogen atoms in the amino group is replaced with a bond to the alkyl group of an otherwise unsubstituted heterocyclylalkyl group. Examples of unsubstituted heterocyclylalkylamino groups include, but are not limited to, 3-pyridylmethylamino, 1-piperidinylmethylamino, and 4-morpholinylmethylamino groups.

WO 03/004488

PCT/US02/20844

-73-

The phrase "substituted heterocyclalkylamino" refers to an amino group in which a bond to one of the hydrogen atoms in the amino group is replaced with a bond to the alkyl group of an otherwise substituted heterocyclalkyl group.

5 The phrase "unsubstituted arylalkylamino" refers to an amino group in which a bond to one of the hydrogen atoms in the amino group is replaced with a bond to the alkyl group of an otherwise unsubstituted arylalkyl group. Examples of unsubstituted arylalkylamino groups include, but are not limited to, phenylmethylamino, and naphthylethylamino groups.

10 The phrase "substituted arylalkylamino" refers to an amino group in which a bond to one of the hydrogen atoms in the amino group is replaced with a bond to the alkyl group of an otherwise substituted arylalkyl group.

The term "protected" with respect to hydroxyl groups, amine groups, and sulfhydryl groups refers to forms of these functionalities which are protected from undesirable reaction with a protecting group known to those skilled in the art
15 such as those set forth in Protective Groups in Organic Synthesis, Greene, T.W., John Wiley & Sons, New York, NY, (1st Edition, 1981) which can be added or removed using the procedures set forth therein. Examples of protected hydroxyl groups include, but are not limited to, silyl ethers such as those obtained by reaction of a hydroxyl group with a reagent such as, but not limited to, t-butyldimethyl-
20 chlorosilane, trimethylchlorosilane, triisopropylchlorosilane, triethylchlorosilane; substituted methyl and ethyl ethers such as, but not limited to methoxymethyl ether, methylthiomethyl ether, benzyloxymethyl ether, t-butoxymethyl ether, 2-methoxyethoxymethyl ether, tetrahydropyranyl ethers, 1-ethoxyethyl ether, allyl ether, benzyl ether; esters such as, but not limited to, benzoylformate, formate,
25 acetate, trichloroacetate, and trifluoroacetate. Examples of protected amine groups include, but are not limited to, amides such as, formamide, acetamide, trifluoroacetamide, and benzamide; imides, such as phthalimide, and dithiosuccinimide; and others. Examples of protected sulfhydryl groups include, but are not limited to, thioethers such as S-benzyl thioether, and S-4-picolyl thioether;

WO 03/004488

PCT/US02/20844

-74-

substituted S-methyl derivatives such as hemithio, dithio and aminothio acetals; and others.

A "pharmaceutically acceptable salt" includes a salt with an inorganic base, organic base, inorganic acid, organic acid, or basic or acidic amino acid. As salts of inorganic bases, the invention includes, for example, alkali metals such as sodium or potassium; alkaline earth metals such as calcium and magnesium or aluminum; and ammonia. As salts of organic bases, the invention includes, for example, trimethylamine, triethylamine, pyridine, picoline, ethanolamine, diethanolamine, and triethanolamine. As salts of inorganic acids, the instant invention includes, for example, hydrochloric acid, hydroboric acid, nitric acid, sulfuric acid, and phosphoric acid. As salts of organic acids, the instant invention includes, for example, formic acid, acetic acid, trifluoroacetic acid, fumaric acid, oxalic acid, tartaric acid, maleic acid, citric acid, succinic acid, malic acid, methanesulfonic acid, benzenesulfonic acid, and p-toluenesulfonic acid. As salts of basic amino acids, the instant invention includes, for example, arginine, lysine and ornithine. Acidic amino acids include, for example, aspartic acid and glutamic acid.

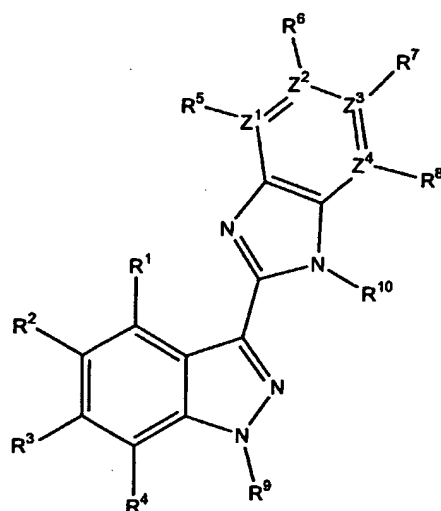
The present invention provides compounds, pharmaceutical formulations including the compounds, methods of preparing the pharmaceutical formulations, and methods of treating patients with the pharmaceutical formulations and compounds.

The present invention provides compounds having the structure I. The invention also provides tautomers of the compounds, pharmaceutically acceptable salts of the compounds, and pharmaceutically acceptable salts of the tautomers. Structure I has the following formula:

WO 03/004488

PCT/US02/20844

-75-



I

where, in the first group of compounds:

Z^1 , Z^2 , Z^3 , and Z^4 are selected independently from C or N;

- R^1 - R^8 are selected independently from the group consisting of -H,
- 5 -F, -Cl, -Br, -C \equiv N, -NO $_2$, -CF $_3$, -CO $_2$ H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryloxy groups,
 - 10 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted alkylheterocyclyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heteroaryl groups, substituted and
 - 15 unsubstituted -C(=O)-N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-76-

unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
-N(H)C(=O)-heteroaryl groups, substituted and unsubstituted -N(H)C(=O)-
heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups,
substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and
5 unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-
alkyl groups, substituted and unsubstituted aryl groups, substituted and
unsubstituted heteroaryl groups, and substituted and unsubstituted heterocyclyl
groups;

R⁹ is -H, -C(=O)-alkyl, or -C(=O)-aryl; and

10 R¹⁰ is -H, -C(=O)-alkyl, or -C(=O)-aryl.

More particular embodiments of the compounds of the invention
having the general structure shown in I above are provided. The second group of
compounds are those for which:

Z¹, Z², Z³, and Z⁴ are independently selected from C or N;

15 R¹ is selected from -H, -F, -Cl, and -Br;

R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, substituted
and unsubstituted amino groups, substituted and unsubstituted alkyl groups,
substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -
C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups,
20 substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and
unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-
heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups,
substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
-N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-
25 alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups,
substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and

WO 03/004488

PCT/US02/20844

-77-

unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted heterocyclylalkoxy groups;

R^3 is selected from -H, -F, -Cl, -Br, and substituted and unsubstituted alkoxy groups;

5 R^4 is -H;

R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^5 is absent if Z^1 is N;

10

R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, and substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups; or R^6 is absent if Z^2 is N;

15

20

25

R^7 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including

WO 03/004488

PCT/US02/20844

-78-

- substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, and substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups; or R^7 is absent if Z^3 is N;
- 15 R^8 is selected from $-H$, $-F$, $-Cl$, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^8 is absent if Z^4 is N;
- 20 R^9 is $-H$; and
- R^{10} is $-H$. In some embodiments of the second group of compounds, at least one of R^1 , R^2 , R^3 , R^5 , R^6 , R^7 or R^8 is not $-H$. In other such embodiments, at least two of R^1 , R^2 , R^3 , R^5 , R^6 , R^7 or R^8 are not $-H$.
- In one embodiment of the second group of compounds, each of Z^1 , Z^2 , Z^3 , and Z^4 are C.
- 25 In another embodiment of the second group of compounds, Z^1 is N and each of Z^2 , Z^3 , and Z^4 are C.

WO 03/004488

PCT/US02/20844

-79-

In another embodiment of the second group of compounds, Z^1 and Z^3 are both N and Z^2 and Z^4 are both C.

In another embodiment of the second group of compounds, Z^3 is N and each of Z^1 , Z^2 , and Z^4 are C.

5 In another embodiment of the second group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is selected from -H, -F, -Cl, and -Br.

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is selected from -H, -F, -Cl, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted heterocyclylalkoxy groups.

20 In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is -H.

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkoxy group having from 1 to 4 carbon atoms.

25 In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is -OMe.

WO 03/004488

PCT/US02/20844

-80-

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is -O-*i*-Pr.

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or
5 unsubstituted arylalkoxy group.

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a benzyloxy group.

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkyl
10 group having from 1 to 4 carbon atoms.

In another embodiment of the second group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a methyl group.

In another embodiment of the second group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from -H,
15 -F, -Cl, and -OMe.

In another embodiment of the second group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from -F, -Cl, -Br, and substituted and unsubstituted alkoxy groups.

In another embodiment of the second group of compounds, Z^1 - Z^4 , R^1 ,
20 and R^2 have any of the values in previous embodiments, and R^3 is -H.

In another embodiment of the second group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -F.

In another embodiment of the second group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -Cl.

WO 03/004488

PCT/US02/20844

-81-

In another embodiment of the second group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -OMe.

In another embodiment of the second group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is H.

5 In another embodiment of the second group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is -CH₃.

In another embodiment of the second group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is morpholine.

10 In another embodiment of the second group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is H.

In another embodiment of the second group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is -CH₃.

15 In another embodiment of the second group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is morpholine.

In another embodiment of the second group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from -Br, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted

20

25

WO 03/004488

PCT/US02/20844

-82-

and unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other such embodiments, R^6 has the values described in the preceding sentence and R^7 is -H.

In another embodiment of the second group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methoxy group. In still other such embodiments where R^6 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^7 is -H.

In another embodiment of the second group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methyl group. In still other such embodiments where R^6 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^7 is -H.

In another embodiment of the second group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$ where m is an integer selected from 0, 1, or 2 and R^{11} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In still other such embodiments, R^{11} is selected from substituted alkoxy groups. In still other such embodiments, R^{11} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other such embodiments where R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$, R^7 is -H.

WO 03/004488

PCT/US02/20844

-83-

In another embodiment of the second group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})CH_2(CH_2)_mR^{13}$ where m is an integer selected from 0, 1, or 2, R^{13} is selected from substituted and

5 unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{12} is $-H$ or a substituted or unsubstituted alkyl group. In some such embodiments R^{12} is H . In other embodiments R^{12} is a $-CH_3$ group. In still other such embodiments, R^{13} is selected from substituted alkoxy groups. In still other such embodiments, R^{13} is selected

10 from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups.

In still other embodiments of the second group of compounds where R^6 is a substituted amino group having the formula $-N(R^{12})CH_2(CH_2)_mR^{13}$, R^7 is $-H$.

15 In another embodiment of the second group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values defined in the previous embodiments, Z^2 is C, and R^6 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the second group of compounds where R^6 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted

20 pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, and substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups. In other embodiments of the second group of

25 compounds where R^6 is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group, a dialkyl substituted morpholinyl group, an unsubstituted piperazine group, a dialkyl substituted piperazinyl group, a monoalkyl substituted piperazinyl group, an aryl substituted piperazinyl group, a $-CH_2C(=O)O$ -alkyl substituted piperazinyl group, a $-C(=O)$ -alkyl substituted

WO 03/004488

PCT/US02/20844

-84-

piperazinyl group, a $-C(=O)O$ -alkyl substituted piperazinyl group, a cycloalkyl substituted piperazinyl group, an unsubstituted piperidine group, an aryl substituted piperidinyl group, a cycloalkyl substituted piperidinyl group, a piperidinyl substituted piperidinyl group, a dialkylamino substituted pyrrolidinyl group, an
5 unsubstituted 2,5-diazabicyclo[2.2.1]heptane group, and an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group. In still other embodiments of the second group of compounds where R^6 is a substituted or unsubstituted heterocyclyl group, R^7 is $-H$.

In another embodiment of the second group of compounds, Z^1 , Z^2 ,
10 Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C , and R^7 is selected from substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
15 $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted
20 and unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups,
25 and substituted and unsubstituted heterocyclylamino groups. In still other such embodiments, R^7 has the values described in the preceding sentence and R^6 is $-H$.

In another embodiment of the second group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C , and R^7 is an alkoxy group having from 1-6 carbon atoms. In still other such

WO 03/004488

PCT/US02/20844

-85-

embodiments, R^7 is a methoxy group. In still other embodiments of the second group of compounds where R^7 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^6 is $-H$.

In another embodiment of the second group of compounds, Z^1 , Z^2 ,
5 Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methyl group. In still other embodiments of the second group of compounds where R^7 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^6 is $-H$.

10 In another embodiment of the second group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$ where n is an integer selected from 0, 1, or 2 and R^{14} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and
15 substituted and unsubstituted heterocyclyl groups. In still other such embodiments, R^{14} is selected from substituted alkoxy groups. In still other such embodiments, R^{14} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments of the second group of compounds
20 where R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$, R^6 is $-H$.

In another embodiment of the second group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted amino group having the formula $-N(R^{15})CH_2(CH_2)_nR^{16}$ where
25 n is an integer selected from 0, 1, or 2, R^{16} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is selected from $-H$ and alkyl groups. In some such embodiments, R^{15} is a $-H$ group. In other such embodiments, R^{15} is a $-CH_3$ group. In still other such embodiments, R^{16} is selected

WO 03/004488

PCT/US02/20844

-86-

from substituted alkoxy groups. In still other such embodiments, R^{16} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups.

- 5 In still other embodiments of the second group of compounds where R^7 is a substituted amino group having the formula $-N(R^{15})CH_2(CH_2)_nR^{16}$, R^6 is $-H$.

- In another embodiment of the second group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C , and R^7 is a substituted or unsubstituted heterocyclyl group. In some such
- 10 embodiments where R^7 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, and substituted
- 15 and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups. In still other embodiments of the second group of compounds where R^7 is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group, a dialkyl substituted morpholinyl group, an unsubstituted piperazine group, a dialkyl substituted piperazinyl group, a monoalkyl substituted piperazinyl group, an aryl substituted
- 20 piperazinyl group, a $-CH_2C(=O)O$ -alkyl substituted piperazinyl group, a $-C(=O)$ -alkyl substituted piperazinyl group, a $-C(=O)O$ -alkyl substituted piperazinyl group, a cycloalkyl substituted piperazinyl group, an unsubstituted piperidine group, an aryl substituted piperidinyl group, a cycloalkyl substituted piperidinyl group, a piperidinyl substituted piperidinyl group, a dialkylamino substituted pyrrolidinyl
- 25 group, an unsubstituted 2,5-diazabicyclo[2.2.1]heptane group, and an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group. In still other embodiments of the second group of compounds where R^7 is a substituted or unsubstituted heterocyclyl group, R^6 is $-H$.

WO 03/004488

PCT/US02/20844

-87-

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a third group of compounds for which:

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

- 5 R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
- 10 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
- 15 groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
- 20 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
- 25 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,

WO 03/004488

PCT/US02/20844

-88-

substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-

5 C(=O)-alkyl-heterocyclyl groups;

R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,

10 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and

15 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,

20 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and

25 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted

30 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-89-

(alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
 heterocyclalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
 5 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclalkyl
 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
 unsubstituted arylaminoalkyl groups, substituted and unsubstituted
 heterocyclalkylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
 groups, substituted and unsubstituted heterocyclalkylaminoalkyl groups,
 10 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and
 unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
 -alkyl-N(H)-C(=O)-heterocyclalkyl groups, substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-heterocyclalkyl groups; or R² and R³ are a group of formula -OCH₂O-
 15 such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;

R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, substituted and
 unsubstituted alkyl groups, substituted and unsubstituted amino groups, substituted
 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-O-alkyl
 groups, substituted and unsubstituted arylalkoxy groups, substituted and
 20 unsubstituted saturated heterocycloxy groups, substituted and unsubstituted
 alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted
 and unsubstituted saturated heterocyclalkyl groups, substituted and unsubstituted
 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl
 groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and
 25 unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and
 unsubstituted -N(H)-(SO₂)-heterocyclalkyl groups, substituted and unsubstituted -
 N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-
 aryl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups,
 substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and
 30 unsubstituted (alkyl)(heterocyclalkyl)aminoalkyl groups substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-90-

- (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
 5 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
 groups, and substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
 groups;
- R⁴ is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
 10 heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups,
 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
 15 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl
 groups, substituted and unsubstituted heterocyclyl groups, substituted and
 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
 20 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
 25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
 30 unsubstituted arylaminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-91-

heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
5 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
10 amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
15 substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
20 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
25 unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-92-

-C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclcyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁸ is absent if Z⁴ is N;

R⁹ is -H; and

R¹⁰ is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups. In some such embodiments of the third group of

WO 03/004488

PCT/US02/20844

-93-

compounds, at least one of R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 or R^8 is not -H. In other such embodiments, at least two of R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 or R^8 are not -H. In some embodiments, R^{10} is -H. In other embodiments, R^{10} is an unsubstituted alkyl group having from 1 to 6 carbon atoms such as a methyl, ethyl, propyl, i-propyl group, or
5 the like. In some such embodiments, R^{10} is a $-CH_3$ group.

In one embodiment of the third group of compounds, each of Z^1 , Z^2 , Z^3 , and Z^4 are C.

In another embodiment of the third group of compounds, Z^1 is N and each of Z^2 , Z^3 , and Z^4 are C.

10 In another embodiment of the third group of compounds, Z^1 and Z^3 are both N and Z^2 and Z^4 are both C.

In another embodiment of the third group of compounds, Z^3 is N and each of Z^1 , Z^2 , and Z^4 are C.

15 In another embodiment of the third group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is selected from -H, -F, -Cl, and -Br.

In another embodiment of the third group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is a substituted and unsubstituted heterocyclamino group. In some such embodiments, R^1 is a substituted and
20 unsubstituted heteroaryl amino groups. In some embodiments, R^1 is a substituted and unsubstituted heterocyclamino group such as, but not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups and the like, such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylamino groups and the like.

In another embodiment of the third group of compounds, Z^1 - Z^4 and
25 R^1 have any of the values in previous embodiments, and R^2 is selected from -H, -F, -Cl, $-CO_2H$, substituted and unsubstituted alkyl groups, substituted and unsubstituted $-C(=O)O$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups,

WO 03/004488

PCT/US02/20844

-94-

substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted $-N(H)C(=O)$ -alkyl groups, substituted and unsubstituted $-N(H)C(=O)$ -aryl groups, substituted and unsubstituted $-N(H)C(=O)$ -heterocyclyl groups, substituted and unsubstituted $-N(H)C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-N(H)C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-N(H)$ -heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted heterocycloxy, and substituted and unsubstituted heterocyclalkoxy groups; or R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the third group of compounds, Z^1-Z^4 and R^1 have any of the values in previous embodiments, and R^2 is $-H$.

In another embodiment of the third group of compounds, Z^1-Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkoxy group having from 1 to 4 carbon atoms.

In another embodiment of the third group of compounds, Z^1-Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a $-OMe$, $-OEt$, $-O-i-Pr$, or $-OCH_2CH(CH_3)_2$ group.

In another embodiment of the third group of compounds, Z^1-Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted arylalkoxy, a substituted or unsubstituted aryloxy group, or a substituted or unsubstituted heterocycloxy group.

In another embodiment of the third group of compounds, Z^1-Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted benzyloxy group, a substituted or unsubstituted phenoxy group, or a substituted or unsubstituted pyridyloxy group.

WO 03/004488

PCT/US02/20844

-95-

In another embodiment of the third group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkyl group having from 1 to 4 carbon atoms.

In another embodiment of the third group of compounds, Z^1 - Z^4 and
5 R^1 have any of the values in previous embodiments, and R^2 is a methyl group.

In another embodiment of the third group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted $-N(H)C(=O)-N(H)$ -alkyl-aryl group.

In another embodiment of the third group of compounds, Z^1 - Z^4 and
10 R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted amino group selected from the group consisting of substituted and unsubstituted alkylamino groups, dialkylamino groups, cycloalkylamino groups, heterocyclylamino groups, heterocyclylalkylamino groups, arylalkylamino groups, arylalkoxyarylmethylamino groups, and aryloxyarylalkylamino groups. In some
15 embodiments, the substituted and unsubstituted alkylamino groups are substituted and unsubstituted aminoalkylamino groups such as, but not limited to, dialkylaminoalkylamino and the like. In some such embodiments the substituted and unsubstituted heterocyclylalkylamino groups are substituted and unsubstituted heteroarylalkylamino groups. In some embodiments, the heterocyclylalkylamino
20 groups include, but are not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylalkylamino groups and the like; substituted and unsubstituted thiazolylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylmethylamino groups and the like; substituted and
25 unsubstituted imidazolylalkylamino groups such as, but not limited to, imidazolylmethylamino groups and the like; substituted and unsubstituted furanylalkylamino groups such as, but not limited to, substituted and unsubstituted furanylmethylamino groups, and the like; and the like. In other such embodiments, the heterocyclylamino groups are substituted and unsubstituted heteroarylamino

WO 03/004488

PCT/US02/20844

-96-

groups. In other such embodiments, the substituted and unsubstituted heterocyclamino groups are substituted and unsubstituted arylalkylheterocyclamino groups.

In another embodiment of the third group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted amino group selected from the group consisting of isopropylamino groups, 3-(N,N-dimethylamino)propylamino groups, pyrrolidinylmethylamino groups, arylmethylamino groups, arylalkoxyaryl methylamino groups, aryloxyaryl methylamino groups, and pyridylmethylamino groups, and pyridylamino groups.

In another embodiment of the third group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted heterocyclyl groups. In some such embodiments R^2 is a substituted or unsubstituted benzimidazolyl group or is a substituted or unsubstituted pyrazolyl group.

In another embodiment of the third group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the third group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from $-H$, $-F$, $-Cl$, and $-OMe$.

In another embodiment of the third group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is $-H$.

In another embodiment of the third group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of $-F$, $-Cl$, $-Br$, $-CF_3$, $-C\equiv N$, substituted and unsubstituted alkyl

WO 03/004488

PCT/US02/20844

-97-

groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms.

- 5 In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is selected from the group consisting of substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups. In some such embodiments, R³ is a substituted or unsubstituted -N(H)C(=O)N(H)CH₂CH₃ group,
- 10 a substituted or unsubstituted -N(H)C(=O)N(H)CH(CH₃)₂ group, a substituted or unsubstituted -N(H)C(=O)N(H)C(CH₃)₃ group, or a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group or the like. In some such embodiments, R³ is a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group such as, but not limited to, a -N(H)C(=O)N(H)-(2-methoxyphenyl) group,
- 15 a -N(H)C(=O)N(H)-(trifluoromethylphenyl) group, or the like.

In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is -F.

In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is -Cl.

- 20 In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and R³ is -OMe.

- In some embodiments of the third group of compounds, Z¹-Z⁴, R¹, and R² have any of the values in previous embodiments, and if R³ is H, at least one of R⁶ or R⁷ is selected from the group consisting of -CO₂H, substituted and
- 25 unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted cycloalkylheterocyclyl

WO 03/004488

PCT/US02/20844

-98-

groups, substituted and unsubstituted saturated heterocycloxy groups, substituted and unsubstituted -N(H)-alkyl groups, substituted and unsubstituted -N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted -N(H)-alkyl-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups. In some such embodiments, if R³ is H, at least one of R⁶ or R⁷ is selected from the group consisting of -CO₂H, substituted and unsubstituted saturated heterocycloxy groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups.

In another embodiment of the third group of compounds, Z²-Z⁴, R¹, R², and R³ have any of the values in previous embodiments, Z¹ is C, and R⁵ is H.

15 In some such embodiments, R⁸ is also H.

In another embodiment of the third group of compounds, Z²-Z⁴, R¹, R², and R³ have any of the values in previous embodiments, Z¹ is C, and R⁵ is -CH₃.

In another embodiment of the third group of compounds, Z²-Z⁴, R¹, R², and R³ have any of the values in previous embodiments, Z¹ is C, and R⁵ is morpholine.

20

In another embodiment of the third group of compounds, Z¹-Z³, R¹, R², and R³ have any of the values in previous embodiments, Z⁴ is C, and R⁸ is H.

In another embodiment of the third group of compounds, Z¹-Z³, R¹, R², and R³ have any of the values in previous embodiments, Z⁴ is C, and R⁸ is -CH₃.

25 In another embodiment of the third group of compounds, Z¹-Z³, R¹, R², and R³ have any of the values in previous embodiments, Z⁴ is C, and R⁸ is morpholine.

WO 03/004488

PCT/US02/20844

-99-

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from a first group of compounds; or Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from the first group of compounds, the first group of compounds comprising members selected from the group consisting of $-CO_2H$, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted cycloalkylheterocyclyl groups, substituted and unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, substituted and unsubstituted heterocyclylamino groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, $-C(=O)N(H)$ -heteroaryl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted $-C(=O)$ -heterocyclyl groups.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from $-Br$, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, substituted and unsubstituted $-C(=O)$ -heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl

WO 03/004488

PCT/US02/20844

-100-

groups; substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other embodiments, R^6 has the values described in the preceding sentence and R^7 is -H.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methoxy group. In still other embodiments of the third group of compounds where R^6 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^7 is -H.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methyl group. In still other embodiments of the third group of compounds where R^6 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^7 is -H.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$ where m is an integer selected from 0, 1, or 2 and R^{11} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In still other such embodiments, R^{11} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{11} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl

WO 03/004488

PCT/US02/20844

-101-

groups, and piperidinyl groups. In still other embodiments where R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$, R^7 is $-H$. In still other embodiments, R^6 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ where p is an integer selected from 0, 1, 2, or 3, R^{13} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{12} is selected from $-H$ or substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl. In some such embodiments, R^{13} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{12} is a CH_3 group. In still other such embodiments, R^{13} is selected from substituted alkoxy groups. In still other such embodiments, R^{13} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some embodiments, R^6 is selected from $-N(H)(3\text{-piperidinyl})$ groups, $-N(H)(4\text{-piperidinyl})$ groups, $-N(H)(4\text{-(2-methoxymethylpyrrolidinyl)})$ groups, $-N(CH_3)(4\text{-(1-methylpiperidinyl)})$ groups, $-N(H)CH_2(2\text{-pyridyl})$ groups, $-N(H)CH_2(3\text{-pyridyl})$ groups, $-N(H)CH_2(4\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(2\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(3\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(4\text{-pyridyl})$ groups, $-N(CH_3)CH_2CH_2(2\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(4\text{-piperidinyl})$ groups, $-N(H)CH_2CH_2(4\text{-morpholinyl})$ groups, $-N(H)CH_2CH_2CH_2(1\text{-imidazolyl})$ groups,

WO 03/004488

PCT/US02/20844

-102-

-N(H)CH₂CH₂CH₂(1-(4-methylpiperazinyl)) groups, -N(H)CH₂CH₂CH₂(4-morpholinyl) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups, -N(H)CH₂CH₂CH₂(1-pyrrolidinyl) groups, -N(CH₃)CH₂CH₂CH₂(diethylamino) groups, and the like.

5 In still other embodiments of the third group of compounds where R⁶ is a substituted amino group having the formula -N(R¹²)(CH₂)_pR¹³, R⁷ is -H.

In another embodiment of the third group of compounds, Z¹, Z³, Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z² is C, and R⁶ is a substituted amino group having the formula -N(R¹²)(CH₂)_pR¹³ or the formula
 10 -N(R¹²)C(H)(alkyl)((CH₂)_pR¹³) where p is an integer selected from 0, 1, 2, or 3, R¹³ is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as -N(H)(alkyl) groups, -N(alkyl)₂ groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R¹² is selected from -H; substituted and
 15 unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; -C(=O)-alkyl groups such as -C(=O)-CH₃ groups and the like; -C(=O)-alkyl-N(H)(alkyl) groups such as -C(=O)-CH₂-N(H)(alkyl) groups and the like; -C(=O)-alkyl-N(alkyl)₂ groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like; -C(=O)-alkyl-N(R^{12a'})(R^{12b'}) groups such as -C(=O)-CH₂-N(alkyl)₂ groups and
 20 the like -C(=O)-alkyl-heterocyclyl groups such as -C(=O)-CH₂-heterocyclyl groups and the like such as -C(=O)-CH₂-(1-piperazinyl) groups and the like; -C(=O)-heterocyclyl groups; -C(=O)-aryl groups; -C(=O)-alkyl-O-alkyl groups such as -C(=O)-CH₂-O-alkyl groups; -C(=O)-alkyl-S-alkyl groups such as -C(=O)-CH₂-S-alkyl groups and the like; and the like where R^{12a'} is selected from -
 25 H, and substituted and unsubstituted alkyl groups, and R^{12b'} is selected from -H, -SO₂-alkyl, -SO₂-aryl, -C(=O)-alkyl, -C(=O)-aryl, heterocyclyl groups such as 2-pyridyl groups and the like, heterocyclylalkyl groups, arylalkyl groups, alkyl groups, and -C(=O)-alkyl-halogen groups.

WO 03/004488

PCT/US02/20844

-103-

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values defined in the previous embodiments, Z^2 is C, and R^6 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the third group of compounds where R^6 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the third group of compounds where R^6 is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group

WO 03/004488

PCT/US02/20844

-104-

and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl

5 substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-

10 (2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a $-\text{CH}_2\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group; a $-\text{C}(=\text{O})$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -ethyl or a $-\text{C}(=\text{O})$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -ethyl or the -

15 $\text{C}(=\text{O})$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^2 , and the like; a $-\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -O-ethyl or a $-\text{C}(=\text{O})$ -O-methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -O-ethyl or the $-\text{C}(=\text{O})$ -O-methyl substitution is on one of the piperazinyl N atoms and

20 the other N atom is bonded to Z^2 , and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl

25 substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl

30 group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like

WO 03/004488

PCT/US02/20844

-105-

such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclylalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still

WO 03/004488

PCT/US02/20844

-106-

other embodiments of the third group of compounds where R^6 is a substituted or unsubstituted heterocyclyl group, R^7 is $-H$.

In another embodiment of the third group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and

5 R^7 is selected from substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups,

10 substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocyclyl)$ groups, substituted and unsubstituted $-C(=O)$ -heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted

15 alkylheterocyclyl groups and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclcyloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted

20 heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other such embodiments, R^7 has the values described in the preceding sentence and R^6 is $-H$.

In another embodiment of the third group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and

25 R^7 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methoxy group. In still other embodiments of the third group of compounds where R^7 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^6 is $-H$.

WO 03/004488

PCT/US02/20844

-107-

In another embodiment of the third group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methyl group. In still other embodiments of the third group of compounds where R^7 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^6 is -H.

In another embodiment of the third group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$ where n is an integer selected from 0, 1, or 2 and R^{14} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In some embodiments, R^{14} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{14} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments of the third group of compounds where R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$, R^6 is -H. In still other embodiments, R^7 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.

In another embodiment of the third group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ where q is an integer selected from 0, 1, 2, or 3 and R^{16} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups,

WO 03/004488

PCT/US02/20844

-108-

and R^{15} is $-H$ or a substituted or unsubstituted alkyl groups, such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups. In some such embodiments, R^{16} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{15} is a CH_3 group. In still other such embodiments, R^{16} is selected from substituted alkoxy groups. In still other such embodiments, R^{16} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some embodiments, R^7 is selected from $-N(H)(3\text{-piperidinyl})$ groups, $-N(H)(4\text{-piperidinyl})$ groups, $-N(H)(4\text{-(2-methoxymethylpyrrolidinyl)})$ groups, $-N(CH_3)(4\text{-(1-methylpiperidinyl)})$ groups, $-N(H)CH_2(2\text{-pyridyl})$ groups, $-N(H)CH_2(3\text{-pyridyl})$ groups, $-N(H)CH_2(4\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(2\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(3\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(4\text{-pyridyl})$ groups, $-N(CH_3)CH_2CH_2(2\text{-pyridyl})$ groups, $-N(H)CH_2CH_2(4\text{-piperidinyl})$ groups, $-N(H)CH_2CH_2(4\text{-morpholinyl})$ groups, $-N(H)CH_2CH_2CH_2(1\text{-imidazolyl})$ groups, $-N(H)CH_2CH_2CH_2(1\text{-(4-methylpiperazinyl)})$ groups, $-N(H)CH_2CH_2CH_2(4\text{-morpholinyl})$ groups, $-N(H)CH_2CH_2CH_2(1\text{-imidazolyl})$ groups, $-N(H)CH_2CH_2CH_2(1\text{-pyrrolidinyl})$ groups, $-N(CH_3)CH_2CH_2CH_2(\text{diethylamino})$ groups, and the like.

In still other embodiments of the third group of compounds where R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$, R^6 is $-H$.

In another embodiment of the third group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C , and R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ or the formula $-N(R^{15})C(H)(\text{alkyl})((CH_2)_qR^{16})$ where q is an integer selected from 0, 1, 2, or 3, R^{16} is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as $-N(H)(\text{alkyl})$ groups, $-N(\text{alkyl})_2$

WO 03/004488

PCT/US02/20844

-109-

- groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is selected from -H; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; -C(=O)-alkyl groups such as -C(=O)-CH₃ groups and the like;
- 5 -C(=O)-alkyl-N(H)(alkyl) groups such as -C(=O)-CH₂-N(H)(alkyl) groups and the like; -C(=O)-alkyl-N(alkyl)₂ groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like; -C(=O)-alkyl-N(R^{15a})(R^{15b}) groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like -C(=O)-alkyl-heterocyclyl groups such as -C(=O)-CH₂-heterocyclyl groups and the like such as -C(=O)-CH₂-(1-piperazinyl) groups and the like;
- 10 -C(=O)-heterocyclyl groups; -C(=O)-aryl groups; -C(=O)-alkyl-O-alkyl groups such as -C(=O)-CH₂-O-alkyl groups; -C(=O)-alkyl-S-alkyl groups such as -C(=O)-CH₂-S-alkyl groups and the like; and the like where R^{15a} is selected from -H, and substituted and unsubstituted alkyl groups, and R^{15b} is selected from -H, -SO₂-alkyl, -SO₂-aryl, -C(=O)-alkyl, -C(=O)-aryl, heterocyclyl groups such as 2-
- 15 pyridyl groups and the like, heterocyclalkyl groups, arylalkyl groups, alkyl groups, and -C(=O)-alkyl-halogen groups.

- In another embodiment of the third group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the
- 20 third group of compounds where R^7 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and
- 25 unsubstituted pyrrolyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-
- 30 diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-

WO 03/004488

PCT/US02/20844

-110-

diazacycloheptane groups. In still other embodiments of the third group of compounds where R⁷ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, 5 but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but 10 not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl 15 substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted 20 piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a 25 heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a -CH₂C(=O)O-alkyl substituted piperazinyl group; a -C(=O)-alkyl substituted piperazinyl group such as, but not limited to, a -C(=O)-ethyl or a -C(=O)-methyl substituted piperazinyl 30 group, and the like such as a piperazinyl group where the -C(=O)-ethyl or the -

WO 03/004488

PCT/US02/20844

-111-

C(=O)-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z³, and the like; a -C(=O)O-alkyl substituted piperazinyl group such as, but not limited to, a -C(=O)-O-ethyl or a -C(=O)-O-methyl substituted piperazinyl group, and the like such as a piperazinyl group where the -C(=O)-O-

5 ethyl or the -C(=O)-O-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z³, and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl

10 substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl

15 groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group

20 and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group

25 such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not

30 limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such

WO 03/004488

PCT/US02/20844

-112-

as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclylalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the third group of compounds where R⁷ is a substituted or unsubstituted heterocyclyl group, R⁶ is -H.

In another embodiment of the third group of compounds, Z¹-Z⁴, R¹, R², and R³ have any of the values in previous embodiments, and one of R⁶ or R⁷ is a substituted or unsubstituted pyridyloxy group. In some such embodiments, one of R⁶ or R⁷ is substituted or unsubstituted 2-pyridyloxy group, a 3-pyridyloxy group, or a 4-pyridyloxy group. In other such embodiments, one of R⁶ or R⁷ is a (2-N-alkylamido-4-pyridyl)oxy group such as a (2-N-methylamido-4-pyridyl)oxy group or the like; or a (5-N-alkylamido-3-pyridyl)oxy group such as a (5-N-methylamido-3-pyridyl)oxy group, or the like.

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a fourth group of compounds for which:

WO 03/004488

PCT/US02/20844

-113-

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-

WO 03/004488

PCT/US02/20844

-114-

C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
C(=O)-alkyl-heterocyclyl groups;

- R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino
- 5 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
- 10 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and
- 15 unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
- 20 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
- 25 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
- 30 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-

WO 03/004488

PCT/US02/20844

-115-

- heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted
- 5 heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-
- 10 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;
- R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
- 15 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy group, substituted and unsubstituted heterocycl groups,
- 20 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocycl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
- 25 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocycl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocycl)aminoalkyl groups substituted and unsubstituted
- 30 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-116-

(alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
-alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
heterocyclalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
5 groups, and substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclalkyl
groups;

R⁴ is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
heterocyclalkoxy groups, substituted and unsubstituted alkoxyalkyl groups,
10 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
-N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
-N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclalkyl
15 groups, substituted and unsubstituted heterocyclalkyl groups, substituted and
unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclalkyl groups,
substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
20 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
(alkyl)(heterocyclalkyl)aminoalkyl groups substituted and unsubstituted
(alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
(alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
-alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
25 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
heterocyclalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclalkyl
groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
unsubstituted arylaminoalkyl groups, substituted and unsubstituted
30 heterocyclalkylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl

WO 03/004488

PCT/US02/20844

-117-

groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

WO 03/004488

PCT/US02/20844

-118-

R^7 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R^7 is absent if Z^3 is N;

R^8 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^8 is absent if Z^4 is N;

R^9 is -H; and

R^{10} is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups. In some such embodiments of the fourth group of compounds, at least one of R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 or R^8 is not -H. In other such embodiments, at least two of R^1 , R^2 , R^3 , R^4 , R^5 , R^6 , R^7 or R^8 are not -H. In some embodiments, R^{10} is -H. In other embodiments, R^{10} is an unsubstituted alkyl group

WO 03/004488

PCT/US02/20844

-119-

having from 1 to 6 carbon atoms such as a methyl, ethyl, propyl, i-propyl group, or the like. In some such embodiments, R^{10} is a $-CH_3$ group

In one embodiment of the fourth group of compounds, each of Z^1 , Z^2 , Z^3 , and Z^4 are C.

5 In another embodiment of the fourth group of compounds, Z^1 is N and each of Z^2 , Z^3 , and Z^4 are C.

In another embodiment of the fourth group of compounds, Z^1 and Z^3 are both N and Z^2 and Z^4 are both C.

10 In another embodiment of the fourth group of compounds, Z^3 is N and each of Z^1 , Z^2 , and Z^4 are C.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is selected from -H, -F, -Cl, and -Br.

15 In another embodiment of the fourth group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is a substituted and unsubstituted heterocyclamino group. In some such embodiments, R^1 is a substituted and unsubstituted heteroarylamino groups. In some embodiments, R^1 is an unsubstituted $-NH_2$ group or is a substituted or unsubstituted heterocyclamino group such as, but not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups and
20 the like, such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylamino groups and the like such as, but not limited to, $-N(H)-CH_2-(2\text{-pyrrolidinyl})$ groups and the like.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is selected from -H, -F,
25 -Cl, $-CO_2H$, substituted and unsubstituted alkyl groups, substituted and unsubstituted $-C(=O)O$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-120-

-C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted heterocycliloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms. In another embodiment of the fourth group of compounds, R^2 is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and unsubstituted pyrrolidinylalkylamino groups, and substituted and unsubstituted aminoalkylamino groups. In other such embodiments, R^2 is selected from the group consisting of -N(H)-CH₂-(2-thiazolyl) groups, -N(H)-CH₂-(2-pyrrolidinyl groups), -N(H)-CH₂CH₂CH₂-N(H)(alkyl) groups, and -NH-CH₂CH₂CH₂-N(alkyl)₂ groups. In still other such embodiments, R^2 is selected from the group consisting of -N(H)-CH₂-(2-thiazolyl) groups, -N(H)-CH₂-(2-pyrrolidinyl groups), -N(H)-CH₂CH₂CH₂-N(H)(CH₃) groups, and -NH-CH₂CH₂CH₂-N(CH₃)₂ groups.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is -H.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkoxy group having from 1 to 4 carbon atoms.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a -OMe, -OEt, -O-*i*-Pr, or -OCH₂CH(CH₃)₂ group.

WO 03/004488

PCT/US02/20844

-121-

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted arylalkoxy, a substituted or unsubstituted aryloxy group, or a substituted or unsubstituted heterocycloxy group.

- 5 In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted benzyloxy group, a substituted or unsubstituted phenoxy group, or a substituted or unsubstituted pyridyloxy group.

- 10 In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkyl group having from 1 to 4 carbon atoms.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a methyl group.

- 15 In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted $-N(H)C(=O)-N(H)$ -alkyl-aryl group.

- In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted amino group selected from the group consisting of substituted and unsubstituted alkylamino groups, dialkylamino groups, cycloalkylamino groups, heterocyclylamino groups, heterocyclylalkylamino groups, arylalkylamino groups, arylalkoxyarylmethylamino groups, and aryloxyarylalkylamino groups. In some embodiments, the substituted and unsubstituted alkylamino groups are substituted and unsubstituted aminoalkylamino groups such as, but not limited to,
- 20 dialkylaminoalkylamino and the like. In some such embodiments the substituted and unsubstituted heterocyclylalkylamino groups are substituted and unsubstituted heteroarylalkylamino groups. In some embodiments, the heterocyclylalkylamino groups include, but are not limited to, substituted and unsubstituted
- 25

WO 03/004488

PCT/US02/20844

-122-

pyrrolidinylalkylamino groups such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylalkylamino groups and the like; substituted and unsubstituted thiazolylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylmethylamino groups and the like; substituted and

5 unsubstituted imidazolylalkylamino groups such as, but not limited to, imidazolylmethylamino groups and the like; substituted and unsubstituted furanylalkylamino groups such as, but not limited to, substituted and unsubstituted furanylmethylamino groups, and the like; and the like. In other such embodiments, the heterocyclylamino groups are substituted and unsubstituted heteroarylamino

10 groups. In other such embodiments, the substituted and unsubstituted heterocyclylamino groups are substituted and unsubstituted arylalkylheterocyclylamino groups.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or

15 unsubstituted amino group selected from the group consisting of isopropylamino groups, 3-(N,N-dimethylamino)propylamino groups, pyrrolidinylmethylamino groups, arylmethylamino groups, arylalkoxyarylmethylamino groups, aryloxyarylmethylamino groups, and pyridylmethylamino groups, and pyridylamino groups.

20 In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted heterocyclyl groups. In some such embodiments R^2 is a substituted or unsubstituted benzimidazolyl group or is a substituted or unsubstituted pyrazolyl group.

25 In another embodiment of the fourth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

WO 03/004488

PCT/US02/20844

-123-

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from -H, -F, -Cl, and -OMe.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 ,
5 and R^2 have any of the values in previous embodiments, and R^3 is -H.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and
unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
10 and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups and substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups; or R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

15 In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups. In some such
embodiments, R^3 is a substituted or unsubstituted -N(H)C(=O)N(H)CH₂CH₃ group,
20 a substituted or unsubstituted -N(H)C(=O)N(H)CH(CH₃)₂ group, a substituted or unsubstituted -N(H)C(=O)N(H)C(CH₃)₃ group, or a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group or the like. In some such embodiments, R^3 is a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group such as, but not limited
to, a -N(H)C(=O)N(H)-(2-methoxyphenyl) group,
25 a -N(H)C(=O)N(H)-(trifluoromethylphenyl) group, or the like.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is a substituted amino group selected from substituted or unsubstituted arylalkylamino groups such

WO 03/004488

PCT/US02/20844

-124-

as, but not limited to, phenylalkylamino groups, (halo)(alkoxy)arylalkylamino groups, such as, but not limited to 2-fluoro-5-methoxyphenylmethylamino groups, monoalkoxyarylalkylamino groups, dialkoxarylalkylamino groups, and the like, such as, but not limited to, 2,5-dialkoxarylalkylamino groups and the like such as,

5 but not limited to 2,5-dialkoxarylmethylamino groups, substituted and unsubstituted arylalkoxyarylalkylamino groups such as, but not limited to substituted and unsubstituted arylalkoxyarylmethylamino groups and the like, such as, but not limited to, substituted and unsubstituted arylmethoxyarylmethylamino groups and the like, such as, but not limited to substituted and unsubstituted

10 fluoroarylmethoxyarylmethylamino groups and the like, such as, but not limited to, substituted and unsubstituted 4-fluorophenylmethoxyphenyl-methylamino groups and the like; substituted and unsubstituted heterocyclylalkylamino groups including heteroarylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylalkylamino groups, benzimidazolylalkylamino groups such as, but not

15 limited to N-methylbenzimidazolylalkylamino groups and the like, imidazolylalkylamino groups such as, but not limited to phenylimidazolylalkylamino groups, ethylmethylimidazolylalkylamino groups, and the like, substituted and unsubstituted quinolinyllalkylamino groups, such as, but not limited to substituted and unsubstituted quinolinylmethylamino groups and the like, such as, but not

20 limited to alkoxyquinolinylmethylamino groups and the like, such as, but not limited to substituted and unsubstituted 4-alkoxy-2-quinolinylmethylamino groups and the like, and furanylalkylamino groups, and the like. In other embodiments of the fourth group of compounds, R³ is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and unsubstituted

25 benzimidazolylalkylamino groups, substituted and unsubstituted imidazolylalkylamino groups, substituted and unsubstituted furanylalkylamino groups, and substituted and unsubstituted arylalkylamino groups. In some such embodiments, R³ is selected from the group consisting of (2-thiazolyl)alkylamino groups, 1-(3-methylbenzimidazolyl)alkylamino groups, 4-(2-

30 phenylimidazolyl)alkylamino groups, 4-(2-ethyl-5-methylimidazolyl)alkylamino

WO 03/004488

PCT/US02/20844

-125-

groups, (2-furanyl)alkylamino groups, phenylalkylamino groups, and 1-(2-fluoro-5-alkoxyphenyl)alkylamino groups. In still other such embodiments, R^3 is selected from the group consisting of -N(H)-CH₂-(2-thiazolyl) groups, -N(H)-CH₂-(1-(3-methylbenzimidazolyl)) groups, -N(H)-CH₂-(4-(2-phenylimidazolyl)) groups, -N(H)-CH₂-(4-(2-ethyl-5-methylimidazolyl)) groups, -N(H)-CH₂-(2-furanyl) groups, -N(H)-CH₂-phenyl groups, and -N(H)-CH₂-(1-(2-fluoro-5-alkoxyphenyl)) groups. In still another embodiment, R^1 is selected from the group consisting of unsubstituted -NH₂ groups, and substituted and unsubstituted pyrrolidinylalkylamino groups; R^2 is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and unsubstituted pyrrolidinylalkylamino groups, and substituted and unsubstituted aminoalkylamino groups; and/or R^3 is selected from the group consisting of substituted and unsubstituted thiazolylalkylamino groups, substituted and unsubstituted benzimidazolylalkylamino groups, substituted and unsubstituted imidazolylalkylamino groups, substituted and unsubstituted furanylalkylamino groups, and substituted and unsubstituted arylalkylamino groups. In such compounds, Z^1 - Z^4 , R^4 , R^5 , R^6 , R^7 , R^8 , R^9 , and R^{10} can have any of the other values described in any of the other embodiments of any of the groups of compounds.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -F.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -Cl.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -OMe.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is a substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups where the heterocyclyl group

WO 03/004488

PCT/US02/20844

-126-

of the $-C(=O)N(H)$ -alkyl-heterocyclyl groups is selected from the group consisting of morpholinyl, piperazinyl, and piperidinyl groups.

In another embodiment of the fourth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is H.

5 In some such embodiments, R^8 is also H.

In another embodiment of the fourth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is $-CH_3$.

In another embodiment of the fourth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is
10 morpholine.

In another embodiment of the fourth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is H.

In another embodiment of the fourth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is $-CH_3$.

15 In another embodiment of the fourth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is morpholine.

In another embodiment of the fourth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and
20 R^6 is selected from a first group; or Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from the first group, the first group comprising members selected from the group consisting of $-Br$, $-CO_2H$, substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups,
25 substituted and unsubstituted heterocyclheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted cycloalkylheterocyclyl groups, substituted and unsubstituted heterocyclloxy groups,

WO 03/004488

PCT/US02/20844

-127-

substituted and unsubstituted aryloxy groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, substituted and unsubstituted heterocyclylamino groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups. In some such embodiments, R³ is selected from the group consisting of -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, and substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the fourth group of compounds, Z¹, Z³, Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z² is C, and R⁶ is selected from -Br, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-128-

heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclyl amino groups. In still other embodiments, R^6 has the values described in the preceding sentence and R^7 is $-H$.

In another embodiment of the fourth group of compounds, $Z^1, Z^3, Z^4,$
5 $R^1, R^2, R^3, R^5,$ and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methoxy group. In still other embodiments of the fourth group of compounds where R^6 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^7 is $-H$.

10 In another embodiment of the fourth group of compounds, $Z^1, Z^3, Z^4,$
 $R^1, R^2, R^3, R^5,$ and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methyl group. In still other embodiments of the fourth group of compounds where R^6 is an alkyl group having from 1-6 carbon atoms such as a
15 methyl group, R^7 is $-H$.

In another embodiment of the fourth group of compounds, $Z^1, Z^3, Z^4,$
 $R^1, R^2, R^3, R^5,$ and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$ where m is an integer selected from 0, 1, or 2 and R^{11} is selected from substituted and
20 unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In still other such embodiments, R^{11} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such
embodiments, R^{11} is selected from substituted and unsubstituted heterocyclyl groups
25 selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments where R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$, R^7 is $-H$. In still other embodiments, R^6 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not

WO 03/004488

PCT/US02/20844

-129-

limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.

In another embodiment of the fourth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ where p is an integer selected from 0, 1, 2, or 3, R^{13} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{12} is selected from -H or substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl. In some such embodiments, R^{13} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{12} is a CH_3 group. In still other such embodiments, R^{13} is selected from substituted alkoxy groups. In still other such embodiments, R^{13} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some embodiments, R^6 is selected from -N(H)(3-piperidinyl) groups, -N(H)(4-piperidinyl) groups, -N(H)(4-(2-methoxymethylpyrrolidinyl)) groups, -N(CH_3)(4-(1-methylpiperidinyl)) groups, -N(H) CH_2 (2-pyridyl) groups, -N(H) CH_2 (3-pyridyl) groups, -N(H) CH_2 (4-pyridyl) groups, -N(H) CH_2CH_2 (2-pyridyl) groups, -N(H) CH_2CH_2 (3-pyridyl) groups, -N(H) CH_2CH_2 (4-pyridyl) groups, -N(CH_3) CH_2CH_2 (2-pyridyl) groups, -N(H) CH_2CH_2 (4-piperidinyl) groups, -N(H) CH_2CH_2 (4-morpholinyl) groups, -N(H) $CH_2CH_2CH_2$ (1-imidazolyl) groups, -N(H) $CH_2CH_2CH_2$ (1-(4-methylpiperazinyl)) groups, -N(H) $CH_2CH_2CH_2$ (4-morpholinyl) groups, -N(H) $CH_2CH_2CH_2$ (1-imidazolyl) groups, -N(H) $CH_2CH_2CH_2$ (1-pyrrolidinyl) groups, -N(CH_3) $CH_2CH_2CH_2$ (diethylamino) groups, and the like.

WO 03/004488

PCT/US02/20844

-130-

In still other embodiments of the fourth group of compounds where R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$, R^7 is -H.

In another embodiment of the fourth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and

5 R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ or the formula $-N(R^{12})C(H)(alkyl)((CH_2)_pR^{13})$ where p is an integer selected from 0, 1, 2, or 3, R^{13} is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as $-N(H)(alkyl)$ groups, $-N(alkyl)_2$ groups and the like, substituted and unsubstituted aryl groups, and substituted and

10 unsubstituted heterocyclyl groups, and R^{12} is selected from -H; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; $-C(=O)-alkyl$ groups such as $-C(=O)-CH_3$ groups and the like; $-C(=O)-alkyl-N(H)(alkyl)$ groups such as $-C(=O)-CH_2-N(H)(alkyl)$ groups and the like; $-C(=O)-alkyl-N(alkyl)_2$ groups such as $-C(=O)-CH_2-N(alkyl)_2$ groups and the

15 like; $-C(=O)-alkyl-N(R^{12a})(R^{12b})$ groups such as $-C(=O)-CH_2-N(alkyl)_2$ groups and the like $-C(=O)-alkyl-heterocyclyl$ groups such as $-C(=O)-CH_2-heterocyclyl$ groups and the like such as $-C(=O)-CH_2-(1-piperazinyl)$ groups and the like; $-C(=O)-heterocyclyl$ groups; $-C(=O)-aryl$ groups; $-C(=O)-alkyl-O-alkyl$ groups such as $-C(=O)-CH_2-O-alkyl$ groups; $-C(=O)-alkyl-S-alkyl$ groups such as

20 $-C(=O)-CH_2-S-alkyl$ groups and the like; and the like where R^{12a} is selected from -H, and substituted and unsubstituted alkyl groups, and R^{12b} is selected from -H, $-SO_2-alkyl$, $-SO_2-aryl$, $-C(=O)-alkyl$, $-C(=O)-aryl$, heterocyclyl groups such as 2-pyridyl groups and the like, heterocyclylalkyl groups, arylalkyl groups, alkyl groups, and $-C(=O)-alkyl-halogen$ groups.

25 In another embodiment of the fourth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values defined in the previous embodiments, Z^2 is C, and R^6 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the fourth group of compounds where R^6 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl

WO 03/004488

PCT/US02/20844

-131-

- groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted
- 5 imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted
- 10 1,4-diazacycloheptane groups. In still other embodiments of the fourth group of compounds where R⁶ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy
- 15 substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the
- 20 ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted
- 25 piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl
- 30 substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl

WO 03/004488

PCT/US02/20844

-132-

group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-

5 (2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a $-\text{CH}_2\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group; a $-\text{C}(=\text{O})$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -ethyl or a $-\text{C}(=\text{O})$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -ethyl or the -

10 $\text{C}(=\text{O})$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^2 , and the like; a $-\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})\text{O}$ -ethyl or a $-\text{C}(=\text{O})\text{O}$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})\text{O}$ -ethyl or the $-\text{C}(=\text{O})\text{O}$ -methyl substitution is on one of the piperazinyl N atoms and

15 the other N atom is bonded to Z^2 , and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl

20 substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl

25 group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl

30 substituted piperidinyl group such as, but not limited to, a piperidinyl substituted

WO 03/004488

PCT/US02/20844

-133-

piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a

5 heterocyclalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such

10 as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a

15 hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted

20 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not

25 limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the fourth group of compounds where R⁶ is a substituted or unsubstituted heterocycl group, R⁷ is -H.

In another embodiment of the fourth group of compounds, Z¹, Z², Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and

30 R⁷ is selected from substituted and unsubstituted alkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-134-

unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, 5 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted 10 alkylheterocyclyl groups and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted 15 heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other such embodiments, R⁷ has the values described in the preceding sentence and R⁶ is -H.

In another embodiment of the fourth group of compounds, Z¹, Z², Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and 20 R⁷ is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R⁷ is a methoxy group. In still other embodiments of the fourth group of compounds where R⁷ is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R⁶ is -H.

In another embodiment of the fourth group of compounds, Z¹, Z², Z⁴, 25 R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and R⁷ is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R⁷ is a methyl group. In still other embodiments of the fourth group of compounds where R⁷ is an alkyl group having from 1-6 carbon atoms such as a methyl group, R⁶ is -H.

WO 03/004488

PCT/US02/20844

-135-

In another embodiment of the fourth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$ where n is an integer selected from 0, 1, or 2 and R^{14} is selected from substituted and
5 unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In some embodiments, R^{14} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{14} is selected from substituted and unsubstituted heterocyclyl groups selected from
10 pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments of the fourth group of compounds where R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$, R^6 is -H. In still other embodiments, R^7 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as,
15 but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.

In another embodiment of the fourth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and
20 R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ where q is an integer selected from 0, 1, 2, or 3 and R^{16} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is -H or a substituted or unsubstituted alkyl groups, such as, but not limited
25 to, methyl, ethyl, propyl, and isopropyl groups. In some such embodiments, R^{16} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{15} is a CH_3 group. In still other such
30 embodiments, R^{16} is selected from substituted alkoxy groups. In still other such

WO 03/004488

PCT/US02/20844

-136-

embodiments, R^{16} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some embodiments, R^7 is selected from -N(H)(3-piperidinyl) groups, -N(H)(4-piperidinyl) groups, -N(H)(4-(2-methoxymethylpyrrolidinyl)) groups, -N(CH₃)(4-(1-methylpiperidinyl)) groups, -N(H)CH₂(2-pyridyl) groups, -N(H)CH₂(3-pyridyl) groups, -N(H)CH₂(4-pyridyl) groups, -N(H)CH₂CH₂(2-pyridyl) groups, -N(H)CH₂CH₂(3-pyridyl) groups, -N(H)CH₂CH₂(4-pyridyl) groups, -N(CH₃)CH₂CH₂(2-pyridyl) groups, -N(H)CH₂CH₂(4-piperidinyl) groups, -N(H)CH₂CH₂(4-morpholinyl) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups, -N(H)CH₂CH₂CH₂(1-(4-methylpiperazinyl)) groups, -N(H)CH₂CH₂CH₂(4-morpholinyl) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups, -N(H)CH₂CH₂CH₂(1-pyrrolidinyl) groups, -N(CH₃)CH₂CH₂CH₂(diethylamino) groups, and the like.

15 In still other embodiments of the fourth group of compounds where R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$, R^6 is -H.

In another embodiment of the fourth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ or the formula $-N(R^{15})C(H)(alkyl)((CH_2)_qR^{16})$ where q is an integer selected from 0, 1, 2, or 3, R^{16} is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as -N(H)(alkyl) groups, -N(alkyl)₂ groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is selected from -H; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; -C(=O)-alkyl groups such as -C(=O)-CH₃ groups and the like; -C(=O)-alkyl-N(H)(alkyl) groups such as -C(=O)-CH₂-N(H)(alkyl) groups and the like; -C(=O)-alkyl-N(alkyl)₂ groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like; -C(=O)-alkyl-N(R^{15a})(R^{15b}) groups such as -C(=O)-CH₂-N(alkyl)₂ groups and

WO 03/004488

PCT/US02/20844

-137-

- the like -C(=O)-alkyl-heterocyclyl groups such as -C(=O)-CH₂-heterocyclyl groups and the like such as -C(=O)-CH₂-(1-piperazinyl) groups and the like; -C(=O)-heterocyclyl groups; -C(=O)-aryl groups; -C(=O)-alkyl-O-alkyl groups such as -C(=O)-CH₂-O-alkyl groups; -C(=O)-alkyl-S-alkyl groups such as
- 5 -C(=O)-CH₂-S-alkyl groups and the like; and the like where R^{15a'} is selected from -H, and substituted and unsubstituted alkyl groups, and R^{15b'} is selected from -H, -SO₂-alkyl, -SO₂-aryl, -C(=O)-alkyl, -C(=O)-aryl, heterocyclyl groups such as 2-pyridyl groups and the like, heterocyclalkyl groups, arylalkyl groups, alkyl groups, and -C(=O)-alkyl-halogen groups.
- 10 In another embodiment of the fourth group of compounds, Z¹, Z², Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and R⁷ is a substituted or unsubstituted heterocyclyl group. In some embodiments of the fourth group of compounds where R⁷ is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and
- 15 unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and
- 20 unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the fourth group of
- 25 compounds where R⁷ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an
- 30 aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group

WO 03/004488

PCT/US02/20844

-138-

including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl

5 group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group

10 and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl

15 group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-,

20 and 4-pyridyl) substituted piperazinyl groups and the like; a $-\text{CH}_2\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group; a $-\text{C}(=\text{O})$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -ethyl or a $-\text{C}(=\text{O})$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -ethyl or the $-\text{C}(=\text{O})$ -methyl substitution is on one of the piperazinyl N atoms and the other N

25 atom is bonded to Z^3 , and the like; a $-\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})\text{O}$ -ethyl or a $-\text{C}(=\text{O})\text{O}$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})\text{O}$ -ethyl or the $-\text{C}(=\text{O})\text{O}$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a cycloalkyl substituted piperazinyl

30 group such as, but not limited to, a cyclohexyl and cyclopentyl substituted

WO 03/004488

PCT/US02/20844

-139-

piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclylalkyl substituted pyrrolidinyl group;

WO 03/004488

PCT/US02/20844

-140-

substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or
5 unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In
10 still other embodiments of the fourth group of compounds where R^7 is a substituted or unsubstituted heterocyclyl group, R^6 is -H.

In another embodiment of the fourth group of compounds, Z^1 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, and one of R^6 or R^7 is a substituted or unsubstituted pyridyloxy group. In some such embodiments, one of
15 R^6 or R^7 is substituted or unsubstituted 2-pyridyloxy group, a 3-pyridyloxy group, or a 4-pyridyloxy group. In other such embodiments, one of R^6 or R^7 is a (2-N-alkylamido-4-pyridyl)oxy group such as a (2-N-methylamido-4-pyridyl)oxy group or the like; or a (5-N-alkylamido-3-pyridyl)oxy group such as a (5-N-methylamido-3-pyridyl)oxy group, or the like.

20 Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such compounds form a fifth group of compounds for which:

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
25 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl

WO 03/004488

PCT/US02/20844

-141-

- groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
- 5 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and
- 10 unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
- 15 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
- 20 groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
- 25 C(=O)-alkyl-heterocyclyl groups;

- R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,
- 30 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and

WO 03/004488

PCT/US02/20844

-142-

- unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
-C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
-C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl
groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and
5 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-
heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups,
substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and
unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
-N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
10 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
15 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy,
substituted and unsubstituted heterocyclylalkoxy groups, substituted and
unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
(alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
(alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
20 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
(alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
-alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
25 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
unsubstituted arylaminoalkyl groups, substituted and unsubstituted
heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,
30 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-143-

unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O-
 5 such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;

R³ is selected from -F, -Cl, -Br, -CF₃, -C≡N, substituted and
 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted
 and unsubstituted arylalkoxy groups, substituted and unsubstituted saturated
 heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups,
 10 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
 saturated heterocycl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl
 groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and
 unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted
 -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted
 15 -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-
 alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups;

R⁴ is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
 heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups,
 20 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocycl
 25 groups, substituted and unsubstituted heterocycl groups, substituted and
 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocycl groups,
 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-144-

- unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
- 5 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
- 10 unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
- 15 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

- R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
- 20 amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁵ is absent if Z¹ is N;

- R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
- 25 substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and

WO 03/004488

PCT/US02/20844

-145-

substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

WO 03/004488

PCT/US02/20844

-146-

R^8 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocycl

5 groups, or R^8 is absent if Z^4 is N;

R^9 is -H; and

R^{10} is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups.

In some embodiments, R^{10} is -H. In other embodiments, R^{10} is an

10 unsubstituted alkyl group having from 1 to 6 carbon atoms such as a methyl, ethyl, propyl, i-propyl group, or the like. In some such embodiments, R^{10} is a -CH₃ group.

In one embodiment of the fifth group of compounds, each of Z^1 , Z^2 , Z^3 , and Z^4 are C.

15 In another embodiment of the fifth group of compounds, Z^1 is N and each of Z^2 , Z^3 , and Z^4 are C.

In another embodiment of the fifth group of compounds, Z^1 and Z^3 are both N and Z^2 and Z^4 are both C.

In another embodiment of the fifth group of compounds, Z^3 is N and

20 each of Z^1 , Z^2 , and Z^4 are C.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is selected from -H, -F, -Cl, and -Br.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 have

25 any of the values in previous embodiments, and R^1 is a substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-147-

heterocyclylamino group. In some such embodiments, R¹ is a substituted and unsubstituted heteroaryl amino groups. In some embodiments, R¹ is a substituted and unsubstituted heterocyclylamino group such as, but not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups and the like, such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylamino groups and the like.

In another embodiment of the fifth group of compounds, Z¹-Z⁴ and R¹ have any of the values in previous embodiments, and R² is selected from -H, -F, -Cl, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted heterocycliloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the fifth group of compounds, Z¹-Z⁴ and R¹ have any of the values in previous embodiments, and R² is -H.

In another embodiment of the fifth group of compounds, Z¹-Z⁴ and R¹ have any of the values in previous embodiments, and R² is an unsubstituted alkoxy group having from 1 to 4 carbon atoms.

WO 03/004488

PCT/US02/20844

-148-

In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a -OMe, -OEt, -O-*i*-Pr, or -OCH₂CH(CH₃)₂ group.

- 5 In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted arylalkoxy, a substituted or unsubstituted aryloxy group, or a substituted or unsubstituted heterocycloxy group.

- 10 In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted benzyloxy group, a substituted or unsubstituted phenoxy group, or a substituted or unsubstituted pyridyloxy group.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkyl group having from 1 to 4 carbon atoms.

- 15 In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a methyl group.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted -N(H)C(=O)-N(H)-alkyl-aryl group.

- 20 In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted amino group selected from the group consisting of substituted and unsubstituted alkylamino groups, dialkylamino groups, cycloalkylamino groups, heterocyclamino groups, heterocyclalkylamino groups, arylalkylamino groups, arylalkoxyarylalkylamino groups, and aryloxyarylalkylamino groups. In some
25 embodiments, the substituted and unsubstituted alkylamino groups are substituted and unsubstituted aminoalkylamino groups such as, but not limited to,

WO 03/004488

PCT/US02/20844

-149-

- dialkylaminoalkylamino and the like. In some such embodiments the substituted and unsubstituted heterocyclalkylamino groups are substituted and unsubstituted heteroarylalkylamino groups. In some embodiments, the heterocyclalkylamino groups include, but are not limited to, substituted and unsubstituted
- 5 pyrrolidinylalkylamino groups such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylalkylamino groups and the like; substituted and unsubstituted thiazolylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylmethylamino groups and the like; substituted and unsubstituted imidazolylalkylamino groups such as, but not limited to,
- 10 imidazolylmethylamino groups and the like; substituted and unsubstituted furanylalkylamino groups such as, but not limited to, substituted and unsubstituted furanylmethylamino groups, and the like; and the like. In other such embodiments, the heterocyclamino groups are substituted and unsubstituted heteroarylamino groups. In other such embodiments, the substituted and unsubstituted
- 15 heterocyclamino groups are substituted and unsubstituted arylalkylheterocyclamino groups.

- In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted amino group selected from the group consisting of isopropylamino
- 20 groups, 3-(N,N-dimethylamino)propylamino groups, pyrrolidinylmethylamino groups, arylmethylamino groups, arylalkoxyaryl methylamino groups, aryloxyaryl methylamino groups, and pyridylmethylamino groups, and pyridylamino groups.

- In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1
- 25 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted heterocycl group. In some such embodiments R^2 is a substituted or unsubstituted benzimidazolyl group or is a substituted or unsubstituted pyrazolyl group.

WO 03/004488

PCT/US02/20844

-150-

In another embodiment of the fifth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

5 In another embodiment of the fifth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from -F, -Cl, and -OMe.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the
10 group consisting of substituted and unsubstituted $-N(H)C(=O)N(H)$ -alkyl groups, and substituted and unsubstituted $-N(H)C(=O)N(H)$ -aryl groups. In some such embodiments, R^3 is a substituted or unsubstituted $-N(H)C(=O)N(H)CH_2CH_3$ group, a substituted or unsubstituted $-N(H)C(=O)N(H)CH(CH_3)_2$ group, a substituted or unsubstituted $-N(H)C(=O)N(H)C(CH_3)_3$ group, or a substituted or unsubstituted
15 $-N(H)C(=O)N(H)$ -aryl group or the like. In some such embodiments, R^3 is a substituted or unsubstituted $-N(H)C(=O)N(H)$ -aryl group such as, but not limited to, a $-N(H)C(=O)N(H)$ -(2-methoxyphenyl) group, a $-N(H)C(=O)N(H)$ -(trifluoromethylphenyl) group, or the like.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 , R^1 ,
20 and R^2 have any of the values in previous embodiments, and R^3 is -F.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -Cl.

In another embodiment of the fifth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -OMe.

25 In some embodiments of the fifth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and at least one of R^6 or R^7 is selected from the group consisting of $-CO_2H$, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-151-

heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclheterocycl groups, substituted and unsubstituted arylheterocycl groups, substituted and unsubstituted cycloalkylheterocycl groups, substituted and unsubstituted saturated heterocycloxy groups, substituted and unsubstituted -N(H)-alkyl groups, substituted and unsubstituted -N(H)-alkyl-heterocycl groups, substituted and unsubstituted -N(H)-alkyl-aryl groups, substituted and unsubstituted -N(H)-heterocycl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocycl groups, and substituted and unsubstituted -C(=O)-heterocycl groups. In some such embodiments, at least one of R⁶ or R⁷ is selected from the group consisting of -CO₂H, substituted and unsubstituted saturated heterocycloxy groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocycl groups, and substituted and unsubstituted -C(=O)-heterocycl groups. In another embodiments of the fifth group of compounds, at least one of R⁶ or R⁷ is selected from the group consisting of substituted and unsubstituted piperidinyl substituted heterocycl groups, substituted and unsubstituted heterocycl substituted piperidinyl groups, substituted and unsubstituted hydroxymethyl substituted piperidinyl groups, dimethylaminoalkyl substituted pyrrolidinyl groups, substituted and unsubstituted 3-alkyl substituted piperazinyl groups, substituted and unsubstituted 3,5-dialkyl substituted piperazinyl groups, substituted and unsubstituted N-hydroxyalkyl substituted piperazinyl groups, substituted and unsubstituted N-alkyl substituted 1,4-diazacycloheptyl groups, substituted and unsubstituted N-ethylpiperazinyl groups, substituted and unsubstituted N-isopropylpiperazinyl groups, substituted and unsubstituted N-sec-butylpiperazinyl groups, unsubstituted piperazinyl groups, substituted and unsubstituted N-2-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-3-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-4-pyridyl substituted piperazinyl groups, substituted and

WO 03/004488

PCT/US02/20844

-152-

unsubstituted N(H)-CH₂-pyridyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted 3-alkyl substituted morpholinyl groups, substituted and unsubstituted 3,5-dialkyl substituted morpholinyl groups, dialkylamino substituted pyrrolidinyl groups, pyrrolidinyl groups substituted with both dialkylamino and alkyl groups, substituted and unsubstituted 4-hydroxy substituted piperidinyl groups, substituted and unsubstituted 4-aryl substituted piperidinyl groups, substituted and unsubstituted 4-hydroxy-4-phenyl substituted piperidinyl groups, substituted and unsubstituted cyclohexylpiperazinyl groups, substituted and unsubstituted cyclopentylpiperazinyl groups, substituted and unsubstituted N-alkyl substituted diazabicycloalkane groups, substituted and unsubstituted -N(CH₃)(N-alkyl(4-piperidinyl)) groups, substituted and unsubstituted piperazinyl groups further substituted with a -C(=O)-alkyl group on one of the N atoms of the piperazinyl group, substituted and unsubstituted -N(H)CH₂CH₂CH₂-imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyridyl groups, substituted and unsubstituted -N(H)CH₂CH₂-imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyridyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, and substituted and unsubstituted 1,4-diazacycloheptane groups. In other embodiments, at least one of R⁶ or R⁷ is selected from the group consisting of piperidinyl substituted piperidinyl groups such as 4-piperidinylpiperidinyl groups or the like, 4-hydroxymethylpiperidinyl groups, 3-dimethylaminomethylpyrrolidinyl groups, 3-alkyl substituted piperazinyl groups, 3,5-dialkyl substituted piperazinyl groups, N-hydroxyethylpiperazinyl groups, N-hydroxymethylpiperazinyl groups, N-

WO 03/004488

PCT/US02/20844

-153-

- hydroxypropylpiperazinyl groups, N-methyl substituted 1,4-diazacycloheptyl groups, N-ethylpiperazinyl groups, N-isopropylpiperazinyl groups, N-sec-butylpiperazinyl groups, unsubstituted piperazinyl groups, N-(2-pyridyl)piperazinyl groups, N-(3-pyridyl)piperazinyl groups, N-(4-pyridyl)piperazinyl groups,
- 5 N(H)-CH₂-pyridyl groups, imidazolyl groups, unsubstituted morpholinyl groups, 3-alkylmorpholinyl groups, 3,5-dialkylmorpholinyl groups, 2-dimethylaminopyrrolidinyl groups, 2-methyl-4-dialkylaminopyrrolidinyl groups, 4-hydroxypiperidinyl groups, 4-aryl piperidinyl groups, 4-hydroxy-4-phenylpiperidinyl groups, cyclohexylpiperazinyl groups,
- 10 cyclopentylpiperazinyl groups, N-methyl substituted diazabicycloalkane groups, -N(CH₃)(N-alkyl(4-piperidinyl)) groups, piperazinyl groups further substituted with a -C(=O)-methyl group on one of the N atoms of the piperazinyl group, -N(H)CH₂CH₂CH₂-imidazolyl groups, -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, -N(H)CH₂CH₂CH₂-morpholinyl groups, -N(H)CH₂CH₂CH₂-piperazinyl groups,
- 15 -N(H)CH₂CH₂CH₂-piperidinyl groups, and -N(H)CH₂CH₂CH₂-pyridyl groups. In some such embodiments, at least one of R⁶ or R⁷ is selected from the group consisting of 4-piperidinylpiperidinyl groups, 4-hydroxymethylpiperidinyl groups, 3-dimethylaminomethylpyrrolidinyl groups, 3,5-dimethyl substituted piperazinyl groups, N-methyl substituted 1,4-diazacycloheptyl groups, N-(2-pyridyl)piperazinyl groups, N(H)-CH₂-(4-pyridyl) groups, imidazolyl groups, unsubstituted morpholinyl groups, 3-methylmorpholinyl groups, 3,5-dimethylmorpholinyl groups, 2-dimethylaminopyrrolidinyl groups, 2-methyl-4-dimethylaminopyrrolidinyl groups, 4-hydroxy-4-phenylpiperidinyl groups, cyclohexylpiperazinyl groups, N-methyl substituted diazabicycloalkane groups, -N(CH₃)(N-methyl(4-piperidinyl)) groups,
- 20 piperazinyl groups further substituted with a -C(=O)-methyl group on one of the N atoms of the piperazinyl group, -N(H)CH₂CH₂CH₂-imidazolyl groups, -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, -N(H)CH₂CH₂CH₂-morpholinyl groups, -N(H)CH₂CH₂CH₂-piperazinyl groups, -N(H)CH₂CH₂CH₂-piperidinyl groups, and -N(H)CH₂CH₂CH₂-pyridyl groups.
- 25

WO 03/004488

PCT/US02/20844

-154-

In another embodiment of the fifth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is H. In some such embodiments, R^8 is also H.

In another embodiment of the fifth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is $-\text{CH}_3$.

In another embodiment of the fifth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is morpholine.

In another embodiment of the fifth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is H.

In another embodiment of the fifth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is $-\text{CH}_3$.

In another embodiment of the fifth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is morpholine.

In another embodiment of the fifth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from a first group of compounds; or Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from the first group of compounds, the first group of compounds comprising members selected from the group consisting of $-\text{CO}_2\text{H}$, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted cycloalkylheterocyclyl groups, substituted and unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-155-

heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups, substituted and unsubstituted heterocyclamino groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, -C(=O)N(H)-heteroaryl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocycl) groups, and substituted and
5 unsubstituted -C(=O)-heterocycl groups.

In another embodiment of the fifth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from -Br, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted
10 heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocycl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocycl) groups, substituted and unsubstituted
15 -C(=O)-heterocycl groups, substituted and unsubstituted heterocycl groups including substituted and unsubstituted heterocyclheterocycl groups, substituted and unsubstituted arylheterocycl groups, substituted and unsubstituted alkylheterocycl groups, and substituted and unsubstituted cycloalkylheterocycl groups; substituted and unsubstituted heterocyclloxy groups, substituted and
20 unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocycl)amino groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclamino groups. In still other
25 embodiments, R^6 has the values described in the preceding sentence and R^7 is -H.

In another embodiment of the fifth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methoxy group. In still other embodiments of the fifth group

WO 03/004488

PCT/US02/20844

-156-

of compounds where R^6 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^7 is -H.

- In another embodiment of the fifth group of compounds, $Z^1, Z^3, Z^4, R^1, R^2, R^3, R^5,$ and R^8 have any of the values in previous embodiments, Z^2 is C, and
- 5 R^6 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^6 is a methyl group. In still other embodiments of the fifth group of compounds where R^6 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^7 is -H.

- In another embodiment of the fifth group of compounds, $Z^1, Z^3, Z^4,$
- 10 $R^1, R^2, R^3, R^5,$ and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$ where m is an integer selected from 0, 1, or 2 and R^{11} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In still other such embodiments,
- 15 R^{11} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{11} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments where R^6 is a substituted
- 20 alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}, R^7$ is -H. In still other embodiments, R^6 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or
- 25 the like.

In another embodiment of the fifth group of compounds, $Z^1, Z^3, Z^4, R^1, R^2, R^3, R^5,$ and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ where p is an integer selected from 0, 1, 2, or 3, R^{13} is selected from substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-157-

alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{12} is selected from -H or substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl. In some such embodiments, R^{13} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{12} is a CH_3 group. In still other such embodiments, R^{13} is selected from substituted alkoxy groups. In still other such

10 embodiments, R^{13} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some embodiments, R^6 is selected from -N(H)(3-piperidinyl) groups, -N(H)(4-piperidinyl) groups, -N(H)(4-(2-methoxymethylpyrrolidinyl)) groups, -N(CH_3)(4-(1-methylpiperidinyl)) groups, -N(H) CH_2 (2-pyridyl) groups, -N(H) CH_2 (3-pyridyl) groups, -N(H) CH_2 (4-pyridyl) groups, -N(H) CH_2CH_2 (2-pyridyl) groups, -N(H) CH_2CH_2 (3-pyridyl) groups, -N(H) CH_2CH_2 (4-pyridyl) groups, -N(CH_3) CH_2CH_2 (2-pyridyl) groups, -N(H) CH_2CH_2 (4-piperidinyl) groups, -N(H) CH_2CH_2 (4-morpholinyl) groups, -N(H) $CH_2CH_2CH_2$ (1-imidazolyl) groups, -N(H) $CH_2CH_2CH_2$ (1-(4-methylpiperazinyl)) groups, -N(H) $CH_2CH_2CH_2$ (4-morpholinyl) groups, -N(H) $CH_2CH_2CH_2$ (1-imidazolyl) groups, -N(H) $CH_2CH_2CH_2$ (1-pyrrolidinyl) groups, -N(CH_3) $CH_2CH_2CH_2$ (diethylamino) groups, and the like.

15

20

In still other embodiments of the fifth group of compounds where R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$, R^7 is -H.

25

In another embodiment of the fifth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ or the formula $-N(R^{12})C(H)(alkyl)((CH_2)_pR^{13})$ where p is an integer selected from 0, 1, 2, or 3, R^{13}

WO 03/004488

PCT/US02/20844

-158-

is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as -N(H)(alkyl) groups, -N(alkyl)₂ groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R¹² is selected from -H; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; -C(=O)-alkyl groups such as -C(=O)-CH₃ groups and the like; -C(=O)-alkyl-N(H)(alkyl) groups such as -C(=O)-CH₂-N(H)(alkyl) groups and the like; -C(=O)-alkyl-N(alkyl)₂ groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like; -C(=O)-alkyl-N(R^{12a'})(R^{12b'}) groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like -C(=O)-alkyl-heterocyclyl groups such as -C(=O)-CH₂-heterocyclyl groups and the like such as -C(=O)-CH₂-(1-piperazinyl) groups and the like; -C(=O)-heterocyclyl groups; -C(=O)-aryl groups; -C(=O)-alkyl-O-alkyl groups such as -C(=O)-CH₂-O-alkyl groups; -C(=O)-alkyl-S-alkyl groups such as -C(=O)-CH₂-S-alkyl groups and the like; and the like where R^{12a'} is selected from -H, and substituted and unsubstituted alkyl groups, and R^{12b'} is selected from -H, -SO₂-alkyl, -SO₂-aryl, -C(=O)-alkyl, -C(=O)-aryl, heterocyclyl groups such as 2-pyridyl groups and the like, heterocyclylalkyl groups, arylalkyl groups, alkyl groups, and -C(=O)-alkyl-halogen groups.

In another embodiment of the fifth group of compounds, Z¹, Z³, Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values defined in the previous embodiments, Z² is C, and R⁶ is a substituted or unsubstituted heterocyclyl group. In some embodiments of the fifth group of compounds where R⁶ is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted

WO 03/004488

PCT/US02/20844

-159-

1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the fifth group of compounds where R⁶ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a -CH₂C(=O)O-alkyl substituted piperazinyl group; a -C(=O)-alkyl substituted piperazinyl group such as, but not limited to, a -C(=O)-ethyl or a -C(=O)-methyl substituted piperazinyl

WO 03/004488

PCT/US02/20844

-160-

group, and the like such as a piperazinyl group where the -C(=O)-ethyl or the -C(=O)-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z², and the like; a -C(=O)O-alkyl substituted piperazinyl group such as, but not limited to, a -C(=O)-O-ethyl or a -C(=O)-O-methyl substituted

5 piperazinyl group, and the like such as a piperazinyl group where the -C(=O)-O-ethyl or the -C(=O)-O-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z², and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted

10 piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy

15 substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited

20 to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and

25 the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as,

30 but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not

WO 03/004488

PCT/US02/20844

-161-

- limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the
- 5 like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-
- 10 diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-
- 15 diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the fifth group of compounds where R^6 is a substituted or unsubstituted heterocycl group, R^7 is -H.
- 20 In another embodiment of the fifth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
- 25 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocycl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocycl) groups, substituted and unsubstituted -C(=O)-heterocycl groups, substituted and unsubstituted heterocycl groups
- 30 including substituted and unsubstituted heterocyclheterocycl groups, substituted

WO 03/004488

PCT/US02/20844

-162-

and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups
5 including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other such embodiments, R^7 has the values described in the preceding sentence and R^6 is $-H$.

10 In another embodiment of the fifth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methoxy group. In still other embodiments of the fifth group of compounds where R^7 is an alkoxy group having from 1-6 carbon atoms such as a
15 methoxy group, R^6 is $-H$.

In another embodiment of the fifth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methyl group. In still other embodiments of the fifth group of
20 compounds where R^7 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^6 is $-H$.

In another embodiment of the fifth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$ where n is an
25 integer selected from 0, 1, or 2 and R^{14} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In some embodiments, R^{14} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{14} is

WO 03/004488

PCT/US02/20844

-163-

- selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments of the fifth group of compounds where R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$, R^6 is –
- 5 H. In still other embodiments, R^7 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.
- 10 In another embodiment of the fifth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ where q is an integer selected from 0, 1, 2, or 3 and R^{16} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted
- 15 and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is –H or a substituted or unsubstituted alkyl groups, such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups. In some such embodiments, R^{16} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino,
- 20 (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{15} is a CH_3 group. In still other such embodiments, R^{16} is selected from substituted alkoxy groups. In still other such embodiments, R^{16} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some
- 25 embodiments, R^7 is selected from –N(H)(3-piperidinyl) groups, –N(H)(4-piperidinyl) groups, –N(H)(4-(2-methoxymethylpyrrolidinyl)) groups, –N(CH_3)(4-(1-methylpiperidinyl)) groups, –N(H) CH_2 (2-pyridyl) groups, –N(H) CH_2 (3-pyridyl) groups, –N(H) CH_2 (4-pyridyl) groups, –N(H) CH_2CH_2 (2-pyridyl) groups,
- 30 –N(H) CH_2CH_2 (3-pyridyl) groups, –N(H) CH_2CH_2 (4-pyridyl) groups,

WO 03/004488

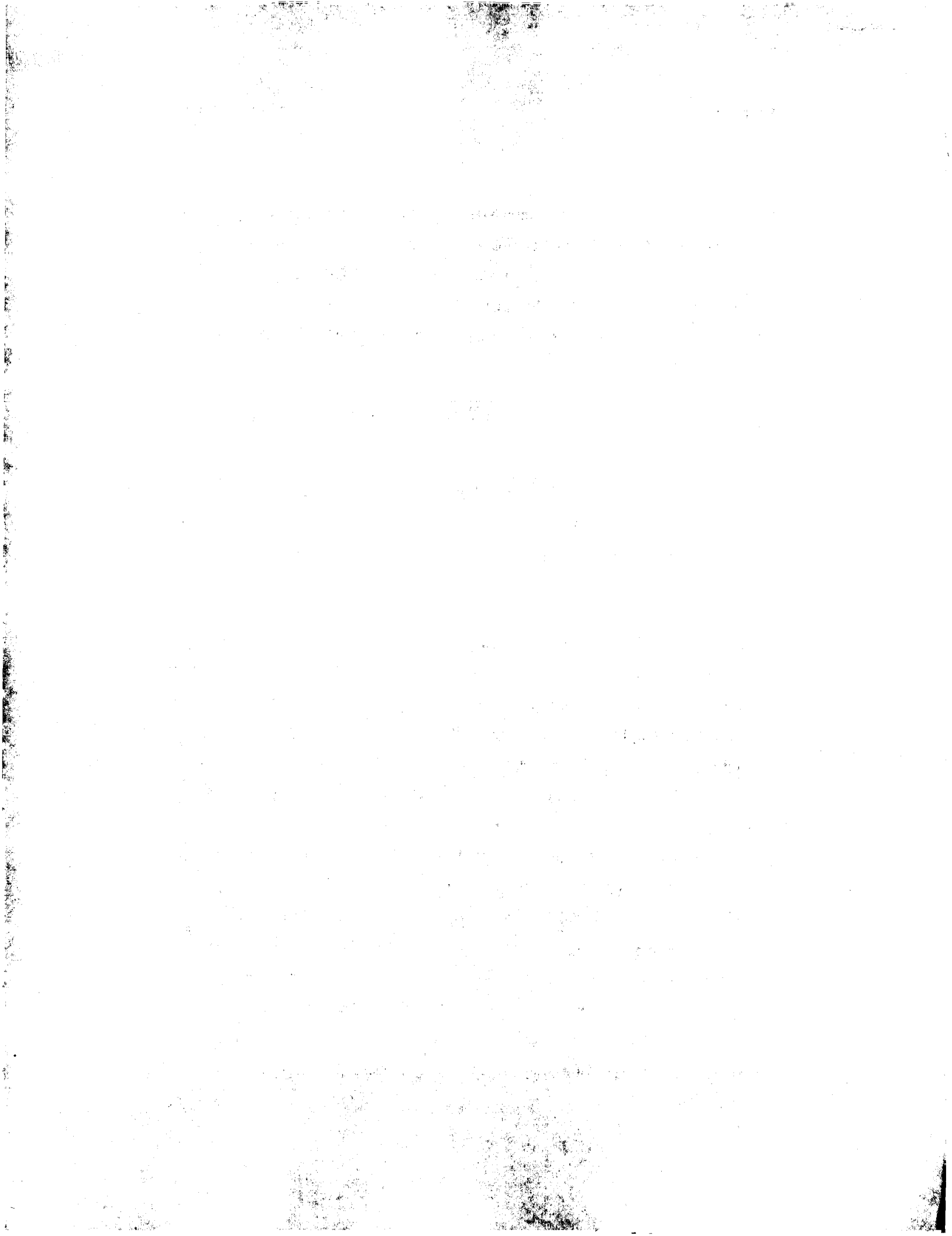
PCT/US02/20844

-164-

- N(CH₃)CH₂CH₂(2-pyridyl) groups -N(H)CH₂CH₂(4-piperidinyl) groups,
 -N(H)CH₂CH₂(4-morpholinyl) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups,
 -N(H)CH₂CH₂CH₂(1-(4-methylpiperazinyl)) groups, -N(H)CH₂CH₂CH₂(4-morpholinyl) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups,
 5 -N(H)CH₂CH₂CH₂(1-pyrrolidinyl) groups, -N(CH₃)CH₂CH₂CH₂(diethylamino) groups, and the like.

In still other embodiments of the fifth group of compounds where R⁷ is a substituted amino group having the formula -N(R¹⁵)(CH₂)_qR¹⁶, R⁶ is -H.

- In another embodiment of the fifth group of compounds, Z¹, Z³, Z⁴,
 10 R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and R⁷ is a substituted amino group having the formula -N(R¹⁵)(CH₂)_qR¹⁶ or the formula -N(R¹⁵)C(H)(alkyl)((CH₂)_qR¹⁶) where q is an integer selected from 0, 1, 2, or 3, R¹⁶ is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as -N(H)(alkyl) groups, -N(alkyl)₂
 15 groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R¹⁵ is selected from -H; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; -C(=O)-alkyl groups such as -C(=O)-CH₃ groups and the like; -C(=O)-alkyl-N(H)(alkyl) groups such as -C(=O)-CH₂-N(H)(alkyl) groups and the
 20 like; -C(=O)-alkyl-N(alkyl)₂ groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like; -C(=O)-alkyl-N(R^{15a'})(R^{15b'}) groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like -C(=O)-alkyl-heterocyclyl groups such as -C(=O)-CH₂-heterocyclyl groups and the like such as -C(=O)-CH₂-(1-piperazinyl) groups and the like; -C(=O)-heterocyclyl groups; -C(=O)-aryl groups; -C(=O)-alkyl-O-alkyl groups
 25 such as -C(=O)-CH₂-O-alkyl groups; -C(=O)-alkyl-S-alkyl groups such as -C(=O)-CH₂-S-alkyl groups and the like; and the like where R^{15a'} is selected from -H, and substituted and unsubstituted alkyl groups, and R^{15b'} is selected from -H, -SO₂-alkyl, -SO₂-aryl, -C(=O)-alkyl, -C(=O)-aryl, heterocyclyl groups such as 2-



WO 03/004488

PCT/US02/20844

-165-

pyridyl groups and the like, heterocyclylalkyl groups, arylalkyl groups, alkyl groups, and -C(=O)-alkyl-halogen groups.

In another embodiment of the fifth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and

5 R^7 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the fifth group of compounds where R^7 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted

10 piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted imidazolyl groups, and substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-

15 diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the fifth group of compounds where R^7 is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as,

20 but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited

25 to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl

30 substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl

WO 03/004488

PCT/US02/20844

-166-

substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as,

5 but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl

10 substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a $-\text{CH}_2\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group; a $-\text{C}(=\text{O})$ -alkyl substituted piperazinyl group such as,

15 but not limited to, a $-\text{C}(=\text{O})$ -ethyl or a $-\text{C}(=\text{O})$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -ethyl or the $-\text{C}(=\text{O})$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a $-\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -O-ethyl or a $-\text{C}(=\text{O})$ -O-methyl substituted

20 piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -O-ethyl or the $-\text{C}(=\text{O})$ -O-methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted

25 piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy

30 substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl

WO 03/004488

PCT/US02/20844

-167-

groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an

WO 03/004488

PCT/US02/20844

-168-

N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the fifth group of compounds where R^7 is a substituted or unsubstituted heterocyclyl group, R^6 is -H.

- 5 In another embodiment of the fifth group of compounds, Z^1 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, and one of R^6 or R^7 is a substituted or unsubstituted pyridyloxy group. In some such embodiments, one of R^6 or R^7 is substituted or unsubstituted 2-pyridyloxy group, a 3-pyridyloxy group, or a 4-pyridyloxy group. In other such embodiments, one of R^6 or R^7 is a (2-N-alkylamido-4-pyridyl)oxy group such as a (2-N-methylamido-4-pyridyl)oxy group or the like; or a (5-N-alkylamido-3-pyridyl)oxy group such as a (5-N-methylamido-3-pyridyl)oxy group, or the like.
- 10

- Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such
- 15 compounds form a sixth group of compounds for which:

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

- R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl
- 20 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
- 25 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-

WO 03/004488

PCT/US02/20844

-169-

heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted

5 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl

10 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R² is selected from -F, -Cl, -Br, -C≡N, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted -C(=O)O-alkyl

20 groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-

25 alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,

30

WO 03/004488

PCT/US02/20844

-170-

-N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted heterocyclyloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;

R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy group, substituted and unsubstituted heterocycl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-171-

- unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and
- 5 unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
- 10 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
- 15 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
- 20 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
- 25 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
- 30 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and

WO 03/004488

PCT/US02/20844

-172-

unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and
5 unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocycl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocycl groups;

R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
10 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocycl groups, or R⁵ is absent if Z¹ is N;

R⁶ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
15 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocycl groups including substituted and unsubstituted heterocyclheterocycl groups, substituted and unsubstituted
20 arylheterocycl groups, substituted and unsubstituted alkylheterocycl groups, and substituted and unsubstituted cycloalkylheterocycl groups; substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocycl)amino
25 groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocycl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-173-

-C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
5 substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
10 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
15 unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-
20 heterocyclyl groups; or R⁷ is absent if Z³ is N;

R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
25 groups, or R⁸ is absent if Z⁴ is N;

R⁹ is -H; and

R¹⁰ is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups.

WO 03/004488

PCT/US02/20844

-174-

In some embodiments, R^{10} is -H. In other embodiments, R^{10} is an unsubstituted alkyl group having from 1 to 6 carbon atoms such as a methyl, ethyl, propyl, i-propyl group, or the like. In some such embodiments, R^{10} is a $-CH_3$ group.

5 In one embodiment of the sixth group of compounds, each of Z^1 , Z^2 , Z^3 , and Z^4 are C.

In another embodiment of the sixth group of compounds, Z^1 is N and each of Z^2 , Z^3 , and Z^4 are C.

10 In another embodiment of the sixth group of compounds, Z^1 and Z^3 are both N and Z^2 and Z^4 are both C.

In another embodiment of the sixth group of compounds, Z^3 is N and each of Z^1 , Z^2 , and Z^4 are C.

15 In another embodiment of the sixth group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is selected from -H, -F, -Cl, and -Br.

20 In another embodiment of the sixth group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is a substituted and unsubstituted heterocyclamino group. In some such embodiments, R^1 is a substituted and unsubstituted heteroarylamino groups. In some embodiments, R^1 is a substituted and unsubstituted heterocyclamino group such as, but not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups and the like, such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylamino groups and the like.

25 In another embodiment of the sixth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkoxy group having from 1 to 4 carbon atoms.

WO 03/004488

PCT/US02/20844

-175-

In another embodiment of the sixth group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a -OMe, -OEt, -O-*i*-Pr, or -OCH₂CH(CH₃)₂ group.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 and
5 R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted arylalkoxy, a substituted or unsubstituted aryloxy group, or a substituted or unsubstituted heterocyclyloxy group.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 and
10 R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted benzyloxy group, a substituted or unsubstituted phenoxy group, or a substituted or unsubstituted pyridyloxy group.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 and
15 R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted -N(H)C(=O)-N(H)-alkyl-aryl group such as, but not limited to, a -N(H)C(=O)-N(H)-CH₂-aryl group, a -N(H)C(=O)-N(H)-CH₂CH₂-aryl group, or the like such as a -N(H)C(=O)-N(H)-CH₂-phenyl group, or a -N(H)C(=O)-N(H)-CH₂CH₂-phenyl group, or the like.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 and
20 R^1 have any of the values in previous embodiments, and R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from -H, -F, -Cl, and -OMe.

25 In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -H.

WO 03/004488

PCT/US02/20844

-176-

In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups and substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups; or R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

- 10 In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups. In some such embodiments, R^3 is a substituted or unsubstituted -N(H)C(=O)N(H)CH₂CH₃ group, 15 a substituted or unsubstituted -N(H)C(=O)N(H)CH(CH₃)₂ group, a substituted or unsubstituted -N(H)C(=O)N(H)C(CH₃)₃ group, or a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group or the like. In some such embodiments, R^3 is a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group such as, but not limited to, a -N(H)C(=O)N(H)-(2-methoxyphenyl) group, 20 a -N(H)C(=O)N(H)-(trifluoromethylphenyl) group, or the like.

- In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is a substituted amino group selected from substituted or unsubstituted arylalkylamino groups such as, but not limited to, phenylalkylamino groups, (halo)(alkoxy)arylalkylamino 25 groups, such as, but not limited to 2-fluoro-5-methoxyphenylmethylamino groups, monoalkoxyarylalkylamino groups, dialkoxyarylalkylamino groups, and the like, such as, but not limited to, 2,5-dialkoxyarylalkylamino groups and the like such as, but not limited to 2,5-dialkoxyarylmethylamino groups, substituted and unsubstituted arylalkoxyarylalkylamino groups such as, but not limited to substituted

WO 03/004488

PCT/US02/20844

-177-

and unsubstituted arylalkoxyarylmethylamino groups and the like, such as, but not limited to, substituted and unsubstituted arylmethoxyarylmethylamino groups and the like, such as, but not limited to substituted and unsubstituted fluoroarylmethoxyarylmethylamino groups and the like, such as, but not limited to, substituted and unsubstituted 4-fluorophenylmethoxyphenyl-methylamino groups and the like; substituted and unsubstituted heterocyclylalkylamino groups including heteroarylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylalkylamino groups, benzimidazolylalkylamino groups such as, but not limited to N-methylbenzimidazolylalkylamino groups and the like, imidazolylalkylamino groups such as, but not limited to phenylimidazolylalkylamino groups, ethylmethylimidazolylalkylamino groups, and the like, substituted and unsubstituted quinolinyllalkylamino groups, such as, but not limited to substituted and unsubstituted quinolinylmethylamino groups and the like, such as, but not limited to alkoxyquinolinylmethylamino groups and the like, such as, but not limited to substituted and unsubstituted 4-alkoxy-2-quinolinylmethylamino groups and the like, and furanylalkylamino groups, and the like.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -F.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -Cl.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -OMe.

In another embodiment of the sixth group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is a substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups where the heterocyclyl group of the -C(=O)N(H)-alkyl-heterocyclyl groups is selected from the group consisting of morpholinyl, piperazinyl, and piperidinyl groups.

WO 03/004488

PCT/US02/20844

-178-

In another embodiment of the sixth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is H. In some such embodiments, R^8 is also H.

In another embodiment of the sixth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is $-CH_3$.

In another embodiment of the sixth group of compounds, Z^2 - Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is morpholine.

In another embodiment of the sixth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is H.

In another embodiment of the sixth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is $-CH_3$.

In another embodiment of the sixth group of compounds, Z^1 - Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is morpholine.

In another embodiment of the sixth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is selected from a first group; or Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is selected from the first group, the first group comprising members selected from the group consisting of $-Br$, $-CO_2H$, substituted and unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and unsubstituted heterocyclheterocycl groups, substituted and unsubstituted arylheterocycl groups, substituted and unsubstituted cycloalkylheterocycl groups, substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted (alkyl)(heterocycl)amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-179-

heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted $-C(=O)N(H)$ -heterocycl groups, substituted and unsubstituted $-C(=O)N(alkyl)(heterocycl)$ groups, and substituted and unsubstituted $-C(=O)$ -heterocycl groups. In some such embodiments, R^3 is selected from the group consisting of $-F$, $-Cl$, $-Br$, $-CF_3$, $-C\equiv N$, $-NO_2$, $-CO_2H$, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, and substituted and unsubstituted $-C(=O)N(H)$ -alkyl-heterocycl groups; or R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms. In another embodiments of the sixth group of compounds, at least one of Z^2 or Z^3 is C and at least one of R^6 or R^7 is selected from the group consisting of substituted and unsubstituted piperidinyl substituted heterocycl groups, substituted and unsubstituted heterocycl substituted piperidinyl groups, substituted and unsubstituted hydroxymethyl substituted piperidinyl groups, dimethylaminoalkyl substituted pyrrolidinyl groups, substituted and unsubstituted 3-alkyl substituted piperazinyl groups, substituted and unsubstituted 3,5-dialkyl substituted piperazinyl groups, substituted and unsubstituted N-hydroxyalkyl substituted piperazinyl groups, substituted and unsubstituted N-alkyl substituted 1,4-diazacycloheptyl groups, substituted and unsubstituted N-ethylpiperazinyl groups, substituted and unsubstituted N-isopropylpiperazinyl groups, substituted and unsubstituted N-sec-butylpiperazinyl groups, unsubstituted piperazinyl groups, substituted and unsubstituted N-2-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-3-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-4-pyridyl substituted piperazinyl groups, substituted and unsubstituted $N(H)-CH_2$ -pyridyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted 3-alkyl substituted morpholinyl groups, substituted and unsubstituted 3,5-dialkyl substituted morpholinyl groups, dialkylamino substituted pyrrolidinyl groups, pyrrolidinyl groups substituted with both dialkylamino and

WO 03/004488

PCT/US02/20844

-180-

- alkyl groups, substituted and unsubstituted 4-hydroxy substituted piperidinyl groups, substituted and unsubstituted 4-aryl substituted piperidinyl groups, substituted and unsubstituted 4-hydroxy-4-phenyl substituted piperidinyl groups, substituted and unsubstituted cyclohexylpiperazinyl groups, substituted and unsubstituted
- 5 cyclopentylpiperazinyl groups, substituted and unsubstituted N-alkyl substituted diazabicycloalkane groups, substituted and unsubstituted -N(CH₃)(N-alkyl(4-piperidinyl)) groups, substituted and unsubstituted piperazinyl groups further substituted with a -C(=O)-alkyl group on one of the N atoms of the piperazinyl group, substituted and unsubstituted -N(H)CH₂CH₂CH₂-imidazolyl groups,
- 10 substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyridyl groups, substituted and unsubstituted -N(H)CH₂CH₂-
- 15 imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyridyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, and
- 20 substituted and unsubstituted 1,4-diazacycloheptane groups. In other embodiments, at least one of R⁶ or R⁷ is selected from the group consisting of piperidinyl substituted piperidinyl groups such as 4-piperidinylpiperidinyl groups or the like, 4-hydroxymethylpiperidinyl groups, 3-dimethylaminomethylpyrrolidinyl groups, 3-alkyl substituted piperazinyl groups, 3,5-dialkyl substituted piperazinyl groups, N-
- 25 hydroxyethylpiperazinyl groups, N-hydroxymethylpiperazinyl groups, N-hydroxypropylpiperazinyl groups, N-methyl substituted 1,4-diazacycloheptyl groups, N-ethylpiperazinyl groups, N-isopropylpiperazinyl groups, N-sec-butylpiperazinyl groups, unsubstituted piperazinyl groups, N-(2-pyridyl)piperazinyl groups, N-(3-pyridyl)piperazinyl groups, N-(4-pyridyl)piperazinyl groups,
- 30 N(H)-CH₂-pyridyl groups, imidazolyl groups, unsubstituted morpholinyl groups, 3-

WO 03/004488

PCT/US02/20844

-181-

- alkylmorpholinyl groups, 3,5-dialkylmorpholinyl groups,
 2-dimethylaminopyrrolidinyl groups, 2-methyl-4-dialkylaminopyrrolidinyl groups,
 4-hydroxypiperidinyl groups, 4-arylpiperidinyl groups,
 4-hydroxy-4-phenylpiperidinyl groups, cyclohexylpiperazinyl groups,
 5 cyclopentylpiperazinyl groups, N-methyl substituted diazabicycloalkane groups,
 -N(CH₃)(N-alkyl(4-piperidinyl)) groups, piperazinyl groups further substituted with
 a -C(=O)-methyl group on one of the N atoms of the piperazinyl group,
 -N(H)CH₂CH₂CH₂-imidazolyl groups, -N(H)CH₂CH₂CH₂-pyrrolidinyl groups,
 -N(H)CH₂CH₂CH₂-morpholinyl groups, -N(H)CH₂CH₂CH₂-piperazinyl groups,
 10 -N(H)CH₂CH₂CH₂-piperidinyl groups, and -N(H)CH₂CH₂CH₂-pyridyl groups. In
 some such embodiments, at least one of R⁶ or R⁷ is selected from the group
 consisting of 4-piperidinylpiperidinyl groups, 4-hydroxymethylpiperidinyl groups,
 3-dimethylaminomethylpyrrolidinyl groups, 3,5-dimethyl substituted piperazinyl
 groups, N-methyl substituted 1,4-diazacycloheptyl groups, N-(2-pyridyl)piperazinyl
 15 groups, N(H)-CH₂-(4-pyridyl) groups, imidazolyl groups, unsubstituted morpholinyl
 groups, 3-methylmorpholinyl groups, 3,5-dimethylmorpholinyl groups,
 2-dimethylaminopyrrolidinyl groups, 2-methyl-4-dimethylaminopyrrolidinyl groups,
 4-hydroxy-4-phenylpiperidinyl groups, cyclohexylpiperazinyl groups, N-methyl
 substituted diazabicycloalkane groups, -N(CH₃)(N-methyl(4-piperidinyl)) groups,
 20 piperazinyl groups further substituted with a -C(=O)-methyl group on one of the N
 atoms of the piperazinyl group, -N(H)CH₂CH₂CH₂-imidazolyl groups,
 -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, -N(H)CH₂CH₂CH₂-morpholinyl groups,
 -N(H)CH₂CH₂CH₂-piperazinyl groups, -N(H)CH₂CH₂CH₂-piperidinyl groups, and
 -N(H)CH₂CH₂CH₂-pyridyl groups.
- 25 In another embodiment of the sixth group of compounds, Z¹, Z³, Z⁴,
 R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z² is C, and
 R⁶ is selected from -Br, substituted and unsubstituted alkyl groups, substituted and
 unsubstituted alkoxy groups including substituted and unsubstituted
 heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
 30 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-182-

-C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups
5 including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclcyloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups
10 including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other embodiments, R⁶ has the values described in the preceding sentence and R⁷ is -H.

15 In another embodiment of the sixth group of compounds, Z¹, Z³, Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z² is C, and R⁶ is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R⁶ is a methoxy group. In still other embodiments of the sixth group of compounds where R⁶ is an alkoxy group having from 1-6 carbon atoms such as a
20 methoxy group, R⁷ is -H.

In another embodiment of the sixth group of compounds, Z¹, Z³, Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z² is C, and R⁶ is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R⁶ is a methyl group. In still other embodiments of the sixth group of
25 compounds where R⁶ is an alkyl group having from 1-6 carbon atoms such as a methyl group, R⁷ is -H.

In another embodiment of the sixth group of compounds, Z¹, Z³, Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z² is C, and R⁶ is a substituted alkoxy group having the formula -OCH₂(CH₂)_mR¹¹ where m is an

WO 03/004488

PCT/US02/20844

-183-

- integer selected from 0, 1, or 2 and R^{11} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In still other such embodiments, R^{11} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{11} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments where R^6 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_mR^{11}$, R^7 is $-H$. In still other
- 10 embodiments, R^6 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.
- 15 In another embodiment of the sixth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ where p is an integer selected from 0, 1, 2, or 3, R^{13} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and
- 20 unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{12} is selected from $-H$ or substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl. In some such embodiments, R^{13} is selected from substituted amino groups such as alkylamino groups and dialkylamino groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the
- 25 like. In some such embodiments, R^{12} is a CH_3 group. In still other such embodiments, R^{13} is selected from substituted alkoxy groups. In still other such embodiments, R^{13} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some
- 30

WO 03/004488

PCT/US02/20844

-184-

- embodiments, R^6 is selected from -N(H)(3-piperidiny) groups, -N(H)(4-piperidiny) groups, -N(H)(4-(2-methoxymethylpyrrolidiny)) groups, -N(CH₃)(4-(1-methylpiperidiny)) groups, -N(H)CH₂(2-pyridyl) groups, -N(H)CH₂(3-pyridyl) groups, -N(H)CH₂(4-pyridyl) groups, -N(H)CH₂CH₂(2-pyridyl) groups, -N(H)CH₂CH₂(3-pyridyl) groups, -N(H)CH₂CH₂(4-pyridyl) groups, -N(CH₃)CH₂CH₂(2-pyridyl) groups, -N(H)CH₂CH₂(4-piperidiny) groups, -N(H)CH₂CH₂(4-morpholiny) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups, -N(H)CH₂CH₂CH₂(1-(4-methylpiperazinyl)) groups, -N(H)CH₂CH₂CH₂(4-morpholiny) groups, -N(H)CH₂CH₂CH₂(1-imidazolyl) groups, -N(H)CH₂CH₂CH₂(1-pyrrolidiny) groups, -N(CH₃)CH₂CH₂CH₂(diethylamino) groups, and the like.

In still other embodiments of the sixth group of compounds where R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$, R^7 is -H.

- In another embodiment of the sixth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^2 is C, and R^6 is a substituted amino group having the formula $-N(R^{12})(CH_2)_pR^{13}$ or the formula $-N(R^{12})C(H)(alkyl)((CH_2)_pR^{13})$ where p is an integer selected from 0, 1, 2, or 3, R^{13} is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as -N(H)(alkyl) groups, -N(alkyl)₂ groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{12} is selected from -H; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; -C(=O)-alkyl groups such as -C(=O)-CH₃ groups and the like; -C(=O)-alkyl-N(H)(alkyl) groups such as -C(=O)-CH₂-N(H)(alkyl) groups and the like; -C(=O)-alkyl-N(alkyl)₂ groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like; -C(=O)-alkyl-N(R^{12a})(R^{12b}) groups such as -C(=O)-CH₂-N(alkyl)₂ groups and the like -C(=O)-alkyl-heterocyclyl groups such as -C(=O)-CH₂-heterocyclyl groups and the like such as -C(=O)-CH₂-(1-piperazinyl) groups and the like; -C(=O)-heterocyclyl groups; -C(=O)-aryl groups; -C(=O)-alkyl-O-alkyl groups

WO 03/004488

PCT/US02/20844

-185-

such as -C(=O)-CH₂-O-alkyl groups; -C(=O)-alkyl-S-alkyl groups such as
-C(=O)-CH₂-S-alkyl groups and the like; and the like where R^{12a'} is selected from -
H, and substituted and unsubstituted alkyl groups, and R^{12b'} is selected from -H,
-SO₂-alkyl, -SO₂-aryl, -C(=O)-alkyl, -C(=O)-aryl, heterocyclyl groups such as 2-
5 pyridyl groups and the like, heterocyclalkyl groups, arylalkyl groups, alkyl
groups, and -C(=O)-alkyl-halogen groups.

In another embodiment of the sixth group of compounds, Z¹, Z³, Z⁴,
R¹, R², R³, R⁵, and R⁸ have any of the values defined in the previous embodiments,
Z² is C, and R⁶ is a substituted or unsubstituted heterocyclyl group. In some
10 embodiments of the sixth group of compounds where R⁶ is a heterocyclyl group, the
heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups,
substituted and unsubstituted pyridyl groups, substituted and unsubstituted
morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted
and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups,
15 substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted
imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups,
substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and
unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted
1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted
20 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted
1,4-diazacycloheptane groups. In still other embodiments of the sixth group of
compounds where R⁶ is a heterocyclyl group, the heterocyclyl group is an
unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as,
but not limited to, a dimethyl substituted morpholinyl group, and the like, such as,
25 but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy
substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an
aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group
including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited
to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but
30 not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the

WO 03/004488

PCT/US02/20844

-186-

ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a $-\text{CH}_2\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group; a $-\text{C}(=\text{O})$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -ethyl or a $-\text{C}(=\text{O})$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -ethyl or the $-\text{C}(=\text{O})$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^2 , and the like; a $-\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})\text{O}$ -ethyl or a $-\text{C}(=\text{O})\text{O}$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})\text{O}$ -ethyl or the $-\text{C}(=\text{O})\text{O}$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^2 , and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4- alkyl

WO 03/004488

PCT/US02/20844

-187-

substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl

5 groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group

10 and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group

15 such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclylalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not

20 limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl

25 group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclylalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-

30 diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted

WO 03/004488

PCT/US02/20844

-188-

2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the sixth group of compounds where R⁶ is a substituted or unsubstituted heterocyclyl group, R⁷ is -H.

In another embodiment of the sixth group of compounds, Z¹, Z², Z⁴, R¹, R², R³, R⁵, and R⁸ have any of the values in previous embodiments, Z³ is C, and R⁷ is selected from substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclcyloxy groups, substituted and unsubstituted aryloxy groups, and substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups. In still other such embodiments, R⁷ has the values described in the preceding sentence and R⁶ is -H.

WO 03/004488

PCT/US02/20844

-189-

In another embodiment of the sixth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is an alkoxy group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methoxy group. In still other embodiments of the sixth group of compounds where R^7 is an alkoxy group having from 1-6 carbon atoms such as a methoxy group, R^6 is -H.

In another embodiment of the sixth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is an alkyl group having from 1-6 carbon atoms. In still other such embodiments, R^7 is a methyl group. In still other embodiments of the sixth group of compounds where R^7 is an alkyl group having from 1-6 carbon atoms such as a methyl group, R^6 is -H.

In another embodiment of the sixth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$ where n is an integer selected from 0, 1, or 2 and R^{14} is selected from substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups. In some embodiments, R^{14} is selected from substituted alkoxy groups such as, but not limited to methoxy groups, ethoxy groups, propoxy groups, and the like. In still other such embodiments, R^{14} is selected from substituted and unsubstituted heterocyclyl groups selected from pyrrolidinyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, and piperidinyl groups. In still other embodiments of the sixth group of compounds where R^7 is a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$, R^6 is -H. In still other embodiments, R^7 is a pyrrolidinylalkoxy groups, such as but not limited to, a pyrrolidinylpropoxy group or the like; an alkoxyethoxy group such as, but not limited to, a methoxyethoxy group or the like; or a substituted or unsubstituted pyridinylalkoxy group such as, but not limited to, (3-pyridinyl)methoxy groups, or the like.

WO 03/004488

PCT/US02/20844

-190-

- In another embodiment of the sixth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ where q is an integer selected from 0, 1, 2, or 3 and R^{16} is selected from substituted and
- 5 unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is -H or a substituted or unsubstituted alkyl groups, such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups. In some such embodiments, R^{16} is selected from substituted amino groups such as alkylamino groups and dialkylamino
 - 10 groups, such as, but not limited to, dimethylamino, diethylamino, dipropylamino, (methyl)(ethyl)amino, (ethyl)(propyl)amino, (methyl)(propyl)amino groups, and the like. In some such embodiments, R^{15} is a CH_3 group. In still other such embodiments, R^{16} is selected from substituted alkoxy groups. In still other such
 - 15 embodiments, R^{16} is selected from substituted and unsubstituted heterocyclyl groups such as those selected from pyrrolidinyl groups, pyrazolyl groups, pyridyl groups, morpholinyl groups, piperazinyl groups, piperidinyl groups, and the like. In some embodiments, R^7 is selected from -N(H)(3-piperidinyl) groups, -N(H)(4-piperidinyl) groups, -N(H)(4-(2-methoxymethylpyrrolidinyl)) groups, -N(CH_3)(4-(1-methylpiperidinyl)) groups, -N(H) CH_2 (2-pyridyl) groups, -N(H) CH_2 (3-pyridyl)
 - 20 groups, -N(H) CH_2 (4-pyridyl) groups, -N(H) CH_2CH_2 (2-pyridyl) groups, -N(H) CH_2CH_2 (3-pyridyl) groups, -N(H) CH_2CH_2 (4-pyridyl) groups, -N(CH_3) CH_2CH_2 (2-pyridyl) groups -N(H) CH_2CH_2 (4-piperidinyl) groups, -N(H) CH_2CH_2 (4-morpholinyl) groups, -N(H) $CH_2CH_2CH_2$ (1-imidazolyl) groups, -N(H) $CH_2CH_2CH_2$ (1-(4-methylpiperazinyl)) groups, -N(H) $CH_2CH_2CH_2$ (4-
 - 25 morpholinyl) groups, -N(H) $CH_2CH_2CH_2$ (1-imidazolyl) groups, -N(H) $CH_2CH_2CH_2$ (1-pyrrolidinyl) groups, -N(CH_3) $CH_2CH_2CH_2$ (diethylamino) groups, and the like.

In still other embodiments of the sixth group of compounds where R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$, R^6 is -H.

WO 03/004488

PCT/US02/20844

-191-

In another embodiment of the sixth group of compounds, Z^1 , Z^3 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted amino group having the formula $-N(R^{15})(CH_2)_qR^{16}$ or the formula $-N(R^{15})C(H)(alkyl)((CH_2)_qR^{16})$ where q is an integer selected from 0, 1, 2, or 3, R^{16} is selected from a methyl group, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups such as $-N(H)(alkyl)$ groups, $-N(alkyl)_2$ groups and the like, substituted and unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and R^{15} is selected from $-H$; substituted and unsubstituted alkyl groups such as, but not limited to, methyl, ethyl, propyl, and isopropyl groups; $-C(=O)$ -alkyl groups such as $-C(=O)-CH_3$ groups and the like; $-C(=O)$ -alkyl- $N(H)(alkyl)$ groups such as $-C(=O)-CH_2-N(H)(alkyl)$ groups and the like; $-C(=O)$ -alkyl- $N(alkyl)_2$ groups such as $-C(=O)-CH_2-N(alkyl)_2$ groups and the like; $-C(=O)$ -alkyl- $N(R^{15a})(R^{15b})$ groups such as $-C(=O)-CH_2-N(alkyl)_2$ groups and the like $-C(=O)$ -alkyl-heterocyclyl groups such as $-C(=O)-CH_2$ -heterocyclyl groups and the like such as $-C(=O)-CH_2$ -(1-piperazinyl) groups and the like; $-C(=O)$ -heterocyclyl groups; $-C(=O)$ -aryl groups; $-C(=O)$ -alkyl-O-alkyl groups such as $-C(=O)-CH_2$ -O-alkyl groups; $-C(=O)$ -alkyl-S-alkyl groups such as $-C(=O)-CH_2$ -S-alkyl groups and the like; and the like where R^{15a} is selected from $-H$, and substituted and unsubstituted alkyl groups, and R^{15b} is selected from $-H$, $-SO_2$ -alkyl, $-SO_2$ -aryl, $-C(=O)$ -alkyl, $-C(=O)$ -aryl, heterocyclyl groups such as 2-pyridyl groups and the like, heterocyclylalkyl groups, arylalkyl groups, alkyl groups, and $-C(=O)$ -alkyl-halogen groups.

In another embodiment of the sixth group of compounds, Z^1 , Z^2 , Z^4 , R^1 , R^2 , R^3 , R^5 , and R^8 have any of the values in previous embodiments, Z^3 is C, and R^7 is a substituted or unsubstituted heterocyclyl group. In some embodiments of the sixth group of compounds where R^7 is a heterocyclyl group, the heterocyclyl group is selected from substituted or unsubstituted pyrrolidinyl groups, substituted and unsubstituted pyridyl groups, substituted and unsubstituted morpholinyl groups, substituted and unsubstituted piperazinyl groups, substituted and unsubstituted piperidinyl groups, substituted and unsubstituted pyrazolyl groups, substituted and

WO 03/004488

PCT/US02/20844

-192-

unsubstituted imidazolyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted pyrrolyl groups, substituted and unsubstituted 1,4-diazacycloheptane groups, substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups, substituted and unsubstituted 1,4-diazabicyclo[2.2.2]octane groups, substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group, and substituted or unsubstituted 1,4-diazacycloheptane groups. In still other embodiments of the sixth group of compounds where R⁷ is a heterocyclyl group, the heterocyclyl group is an unsubstituted morpholine group; a dialkyl substituted morpholinyl group such as, but not limited to, a dimethyl substituted morpholinyl group, and the like, such as, but not limited to, a 3,5-dimethyl substituted morpholinyl group; a hydroxy substituted morpholinyl group; a hydroxyalkyl substituted morpholinyl group; an aryl substituted morpholinyl group; an aminoalkyl substituted morpholinyl group including dialkylaminoalkyl substituted morpholinyl groups such as, but not limited to, dimethylaminomethyl substituted morpholinyl groups and the like such as, but not limited to, a morpholinyl group that is substituted on a ring carbon bonded to the ring O atom with a dimethylaminomethyl group and is substituted with a methyl group on the carbon bonded to the ring N atom which carbon is not bonded to the carbon bearing the dimethylaminomethyl group and the like; a heterocyclyl substituted morpholinyl group; an unsubstituted piperazine group; a dialkyl substituted piperazinyl group such as, but not limited to, a dimethyl substituted piperazinyl group, and the like such as a 3,5-dimethyl substituted piperazinyl group and the like; a monoalkyl substituted piperazinyl group such as a 3-alkyl substituted piperazinyl group, an N-alkyl substituted piperazinyl group, and the like such as, but not limited to, a 3-methyl substituted piperazinyl group, a N-alkyl substituted piperazinyl group, such as, but not limited to, N-methyl, N-ethyl, N-isopropyl substituted piperazinyl groups and the like; a hydroxyalkyl substituted piperazinyl group such as, but not limited to, hydroxyethyl and hydroxymethyl substituted piperazinyl groups and the like such as, but not limited to, N-hydroxyethyl substituted piperazinyl groups and the like; an aryl substituted piperazinyl group; a

WO 03/004488

PCT/US02/20844

-193-

heterocyclyl substituted piperazinyl group such as, but not limited to, 2-, 3-, and 4-(2-, 3-, and 4-piperidinyl) substituted piperazinyl groups and 2-, 3-, and 4-(2-, 3-, and 4-pyridyl) substituted piperazinyl groups and the like; a $-\text{CH}_2\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group; a $-\text{C}(=\text{O})$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})$ -ethyl or a $-\text{C}(=\text{O})$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})$ -ethyl or the $-\text{C}(=\text{O})$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a $-\text{C}(=\text{O})\text{O}$ -alkyl substituted piperazinyl group such as, but not limited to, a $-\text{C}(=\text{O})\text{O}$ -ethyl or a $-\text{C}(=\text{O})\text{O}$ -methyl substituted piperazinyl group, and the like such as a piperazinyl group where the $-\text{C}(=\text{O})\text{O}$ -ethyl or the $-\text{C}(=\text{O})\text{O}$ -methyl substitution is on one of the piperazinyl N atoms and the other N atom is bonded to Z^3 , and the like; a cycloalkyl substituted piperazinyl group such as, but not limited to, a cyclohexyl and cyclopentyl substituted piperazinyl group and the like such as, but not limited to, a N-cyclohexyl substituted piperazinyl group and the like; an unsubstituted piperidine group; an alkyl substituted piperidinyl group such as, but not limited to, 2-, 3-, and 4-alkyl substituted piperidinyl groups, and the like such as, but not limited to, 2-, 3-, and 4-hydroxyalkyl substituted piperidinyl groups and the like such as, but not limited to, 2-, 3-, and 4-hydroxymethyl substituted piperidinyl groups and the like; a hydroxy substituted piperidinyl group such as 2-, 3-, and 4-hydroxy substituted piperidinyl groups; a hydroxyalkyl substituted piperidinyl group; an aryl substituted piperidinyl group such as, but not limited to, a 4-aryl substituted piperidinyl group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both an aryl group and a hydroxy group and the like such as, but not limited to, a piperidinyl group that is substituted in the 4 position with both a hydroxy group and a phenyl group; a cycloalkyl substituted piperidinyl group; a heterocyclyl substituted piperidinyl group such as, but not limited to, a piperidinyl substituted piperidinyl group and the like such as, but not limited to, 4-piperidinyl substituted piperidinyl groups, 4-(2(3H)-benzimidazolone) substituted piperidinyl group, and the like; an unsubstituted pyrrolidinyl group; an alkyl substituted pyrrolidinyl group

WO 03/004488

PCT/US02/20844

-194-

such as, but not limited to, a methyl substituted pyrrolidinyl group, a heterocyclalkyl substituted pyrrolidinyl group, and the like such as, but not limited to, a 2-methyl substituted pyrrolidinyl group, a 2-pyrrolidinylmethyl substituted pyrrolidinyl group, and the like; an amino substituted pyrrolidinyl group such as, but not limited to, a dialkylamino substituted pyrrolidinyl group such as, but not limited to, 2- and 3-dialkylamino substituted pyrrolidinyl groups and the like such as, but not limited to, 2- and 3- substituted N,N-dimethylamino substituted pyrrolidinyl groups and the like such as, but not limited to, a pyrrolidinyl group that is substituted with both an alkyl group and an N,N-dimethylamino group and the like such as, but not limited to, a pyrrolidinyl group that is substituted with a methyl group in the 2 position and with a N,N-dimethylamino group in the 4 position; a hydroxy substituted pyrrolidinyl group such as, but not limited to, 2- and 3-hydroxy substituted pyrrolidinyl groups; a heterocyclalkyl substituted pyrrolidinyl group; substituted and unsubstituted pyrrolyl groups; substituted and unsubstituted 2,5-diazabicyclo[2.2.1]heptane groups; an alkyl substituted 2,5-diazabicyclo[2.2.1]heptane group such as, but not limited to, a N-methyl substituted 2,5-diazabicyclo[2.2.1]heptane group and the like; a substituted or unsubstituted 1,4-diazabicyclo[4.3.0]nonane group; and a substituted or unsubstituted 1,4-diazacycloheptane group such as, but not limited to, an alkyl substituted 1,4-diazacycloheptane group and the like, such as, but not limited to, an N-alkyl substituted 1,4-diazacycloheptane substituted group and the like such as, but not limited to, a N-methyl substituted 1,4-diazacycloheptane group and the like. In still other embodiments of the sixth group of compounds where R⁷ is a substituted or unsubstituted heterocycl group, R⁶ is -H.

25 In another embodiment of the sixth group of compounds, Z¹-Z⁴, R¹, R², and R³ have any of the values in previous embodiments, and one of R⁶ or R⁷ is a substituted or unsubstituted pyridyloxy group. In some such embodiments, one of R⁶ or R⁷ is substituted or unsubstituted 2-pyridyloxy group, a 3-pyridyloxy group, or a 4-pyridyloxy group. In other such embodiments, one of R⁶ or R⁷ is a (2-N-alkylamido-4-pyridyl)oxy group such as a (2-N-methylamido-4-pyridyl)oxy group or

WO 03/004488

PCT/US02/20844

-195-

the like; or a (5-N-alkylamido-3-pyridyl)oxy group such as a (5-N-methylamido-3-pyridyl)oxy group, or the like.

Other more particular embodiments of the compounds of the invention having the general structure shown in I above are provided. Such
5 compounds form a seventh group of compounds for which:

Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
10 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
15 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups,
20 substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
25 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-196-

heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted

5 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

R² is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH, substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino

10 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted

15 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and

20 unsubstituted -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,

25 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocycliloxy, substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted

30 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-197-

- (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-
 5 C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-
 heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl
 groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and
 unsubstituted arylaminoalkyl groups, substituted and unsubstituted
 10 heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl
 groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,
 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and
 unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-
 15 C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-
 C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula -OCH₂O-
 such that R² and R³ define a fused 5-membered ring that includes 2 oxygen atoms;
- R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H,
 substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
 20 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
 -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
 and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
 unsubstituted aryloxy group, substituted and unsubstituted heterocyclyl groups,
 25 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
 unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
 30 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-198-

- C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
- 5 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
- 10 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,
- 15 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 20 R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted heterocycliloxy groups, substituted and unsubstituted alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
- 25 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
- 30 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl

WO 03/004488

PCT/US02/20844

-199-

- groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
- 5 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-aryl
- 10 groups, substituted and unsubstituted -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups, substituted and unsubstituted heterocyclylaminoalkyl groups substituted and unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted heterocyclylalkylaminoalkyl groups,
- 15 substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 20 R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R^5 is absent if Z^1 is N;
- 25 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and

WO 03/004488

PCT/US02/20844

-200-

unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;

R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino groups including substituted and unsubstituted dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups, and substituted and unsubstituted heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-201-

-C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino groups, substituted and unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl groups, or R⁸ is absent if Z⁴ is N;

R⁹ is -H;

R¹⁰ is selected from the group consisting of -H, and substituted and unsubstituted alkyl groups; and

at least one of Z² or Z³ is C and at least one of R⁶ or R⁷ is selected from the group consisting of substituted and unsubstituted piperidinyl substituted heterocyclyl groups, substituted and unsubstituted heterocyclyl substituted piperidinyl groups, substituted and unsubstituted hydroxymethyl substituted piperidinyl groups, dimethylaminoalkyl substituted pyrrolidinyl groups, substituted and unsubstituted 3-alkyl substituted piperazinyl groups, substituted and unsubstituted 3,5-dialkyl substituted piperazinyl groups, substituted and unsubstituted N-hydroxyalkyl substituted piperazinyl groups, substituted and unsubstituted 1,4-diazacycloheptyl groups, substituted and unsubstituted 1-aza-4-oxacycloheptyl groups, substituted and unsubstituted N-ethylpiperazinyl groups, substituted and unsubstituted N-isopropylpiperazinyl groups, substituted and unsubstituted N-sec-butylpiperazinyl groups, substituted and unsubstituted N-2-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-3-pyridyl substituted piperazinyl groups, substituted and unsubstituted N-4-pyridyl substituted piperazinyl groups, substituted and unsubstituted N(H)-CH₂-pyridyl groups, substituted and unsubstituted imidazolyl groups, substituted and unsubstituted 3-alkyl substituted morpholinyl groups, substituted and unsubstituted 3,5-dialkyl substituted morpholinyl groups, dialkylamino substituted pyrrolidinyl groups,

WO 03/004488

PCT/US02/20844

-202-

pyrrolidinyl groups substituted with both dialkylamino and alkyl groups, substituted and unsubstituted 4-hydroxy substituted piperidinyl groups, substituted and unsubstituted 4-aryl substituted piperidinyl groups, substituted and unsubstituted 4-hydroxy-4-phenyl substituted piperidinyl groups, substituted and unsubstituted
 5 cyclohexylpiperazinyl groups, substituted and unsubstituted cyclopentylpiperazinyl groups, substituted and unsubstituted N-alkyl substituted diazabicycloalkane groups, substituted and unsubstituted -N(CH₃)(N-alkyl(4-piperidinyl)) groups, substituted and unsubstituted piperazinyl groups further substituted with a -C(=O)-alkyl group on one of the N atoms of the piperazinyl group, substituted and unsubstituted
 10 -N(H)CH₂CH₂CH₂-imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂CH₂-piperidinyl groups, substituted and unsubstituted
 15 -N(H)CH₂CH₂CH₂-pyridyl groups, substituted and unsubstituted -N(H)CH₂CH₂-imidazolyl groups, substituted and unsubstituted -N(H)CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-morpholinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperazinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-piperidinyl groups, substituted and unsubstituted -N(H)CH₂CH₂-
 20 pyridyl groups, substituted and unsubstituted cyclobutylpiperazinyl groups, substituted and unsubstituted -OCH₂-pyrrolidinyl groups, substituted and unsubstituted -OCH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted -OCH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted piperazinyl groups further substituted with a -CH₂C(=O)-O-alkyl group bonded to one of the N atoms
 25 of the piperazinyl group, substituted and unsubstituted piperazinyl groups further substituted with a -C(=O)-O-alkyl group bonded to one of the N atoms of the piperazinyl group, substituted and unsubstituted hydroxypyrrolidinyl groups, substituted and unsubstituted hydroxypiperidinyl groups, substituted and unsubstituted -OCH₂-pyridyl groups, substituted and unsubstituted piperidinylamino
 30 groups, substituted and unsubstituted pyridyloxy groups with a -C(=O)-N(H)(alkyl)

WO 03/004488

PCT/US02/20844

-203-

group bonded to a carbon atom of the pyridine ring of the pyridyloxy group, and substituted and unsubstituted pyridyloxy groups with a $-C(=O)-N(alkyl)_2$ group bonded to a carbon atom of the pyridine ring of the pyridyloxy group.

5 In some embodiments, R^{10} is $-H$. In other embodiments, R^{10} is an unsubstituted alkyl group having from 1 to 6 carbon atoms such as a methyl, ethyl, propyl, i-propyl group, or the like. In some such embodiments, R^{10} is a $-CH_3$ group.

In one embodiment of the seventh group of compounds, each of Z^1 , Z^2 , Z^3 , and Z^4 are C.

10 In another embodiment of the seventh group of compounds, Z^1 is N and each of Z^2 , Z^3 , and Z^4 are C.

In another embodiment of the seventh group of compounds, Z^1 and Z^3 are both N and Z^2 and Z^4 are both C.

15 In another embodiment of the seventh group of compounds, Z^3 is N and each of Z^1 , Z^2 , and Z^4 are C.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is selected from $-H$, $-F$, $-Cl$, and $-Br$.

20 In another embodiment of the seventh group of compounds, Z^1 - Z^4 have any of the values in previous embodiments, and R^1 is a substituted and unsubstituted heterocycylamino group. In some such embodiments, R^1 is a substituted and unsubstituted heteroaryl amino groups. In some embodiments, R^1 is a substituted and unsubstituted heterocycylamino group such as, but not limited to, substituted and unsubstituted pyrrolidinylalkylamino groups and the like, such as, but
25 not limited to, substituted and unsubstituted pyrrolidinylmethylamino groups and the like.

WO 03/004488

PCT/US02/20844

-204-

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is selected from -H, -F, -Cl, -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted heterocycloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is -H.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkoxy group having from 1 to 4 carbon atoms.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a -OMe, -OEt, -O-*i*-Pr, or -OCH₂CH(CH₃)₂ group.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted arylalkoxy, a substituted or unsubstituted aryloxy group, or a substituted or unsubstituted heterocycloxy group.

WO 03/004488

PCT/US02/20844

-205-

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted benzyloxy group, a substituted or unsubstituted phenoxy group, or a substituted or unsubstituted pyridyloxy group.

- 5 In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is an unsubstituted alkyl group having from 1 to 4 carbon atoms.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a methyl group.

- 10 In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted $-N(H)C(=O)-N(H)$ -alkyl-aryl group.

- In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or
- 15 unsubstituted amino group selected from the group consisting of substituted and unsubstituted alkylamino groups, dialkylamino groups, cycloalkylamino groups, heterocyclylamino groups, heterocyclylalkylamino groups, arylalkylamino groups, arylalkoxyarylmethylamino groups, and aryloxyarylalkylamino groups. In some
- embodiments, the substituted and unsubstituted alkylamino groups are substituted
- 20 and unsubstituted aminoalkylamino groups such as, but not limited to, dialkylaminoalkylamino and the like. In some such embodiments the substituted and unsubstituted heterocyclylalkylamino groups are substituted and unsubstituted heteroarylalkylamino groups. In some embodiments, the heterocyclylalkylamino groups include, but are not limited to, substituted and unsubstituted
- 25 pyrrolidinylalkylamino groups such as, but not limited to, substituted and unsubstituted pyrrolidinylmethylalkylamino groups and the like; substituted and unsubstituted thiazolylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylmethylamino groups and the like; substituted and

WO 03/004488

PCT/US02/20844

-206-

unsubstituted imidazolylalkylamino groups such as, but not limited to, imidazolylmethylamino groups and the like; substituted and unsubstituted furanylalkylamino groups such as, but not limited to, substituted and unsubstituted furanylmethylamino groups, and the like; and the like. In other such embodiments, the heterocyclylamino groups are substituted and unsubstituted heteroarylamino groups. In other such embodiments, the substituted and unsubstituted heterocyclylamino groups are substituted and unsubstituted arylalkylheterocyclylamino groups.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted amino group selected from the group consisting of isopropylamino groups, 3-(N,N-dimethylamino)propylamino groups, pyrrolidinylmethylamino groups, arylmethylamino groups, arylalkoxyaryl methylamino groups, aryloxyaryl methylamino groups, and pyridylmethylamino groups, and pyridylamino groups.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 is a substituted or unsubstituted heterocyclyl groups. In some such embodiments R^2 is a substituted or unsubstituted benzimidazolyl group or is a substituted or unsubstituted pyrazolyl group.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 and R^1 have any of the values in previous embodiments, and R^2 and R^3 are a group of formula $-OCH_2O-$ such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from $-H$, $-F$, $-Cl$, and $-OMe$.

WO 03/004488

PCT/US02/20844

-207-

In another embodiment of the seventh group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -H.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups and substituted and unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups; or R^2 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused 5-membered ring that includes 2 oxygen atoms.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is selected from the group consisting of substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted -N(H)C(=O)N(H)-aryl groups. In some such embodiments, R^3 is a substituted or unsubstituted -N(H)C(=O)N(H)CH₂CH₃ group, a substituted or unsubstituted -N(H)C(=O)N(H)CH(CH₃)₂ group, a substituted or unsubstituted -N(H)C(=O)N(H)C(CH₃)₃ group, or a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group or the like. In some such embodiments, R^3 is a substituted or unsubstituted -N(H)C(=O)N(H)-aryl group such as, but not limited to, a -N(H)C(=O)N(H)-(2-methoxyphenyl) group, a -N(H)C(=O)N(H)-(trifluoromethylphenyl) group, or the like.

In another embodiment of the seventh group of compounds, Z^1 - Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is a substituted amino group selected from substituted or unsubstituted arylalkylamino groups such as, but not limited to, phenylalkylamino groups, (halo)(alkoxy)arylalkylamino groups, such as, but not limited to 2-fluoro-5-methoxyphenylmethylamino groups, monoalkoxyarylalkylamino groups, dialkoxyarylalkylamino groups, and the like, such as, but not limited to, 2,5-dialkoxyarylalkylamino groups and the like such as,

WO 03/004488

PCT/US02/20844

-208-

but not limited to 2,5-dialkoxyarylmethylamino groups, substituted and unsubstituted arylalkoxyarylalkylamino groups such as, but not limited to substituted and unsubstituted arylalkoxyarylmethylamino groups and the like, such as, but not limited to, substituted and unsubstituted arylmethoxyarylmethylamino groups and the like, such as, but not limited to substituted and unsubstituted fluoroarylmethoxyarylmethylamino groups and the like, such as, but not limited to, substituted and unsubstituted 4-fluorophenylmethoxyphenyl-methylamino groups and the like; substituted and unsubstituted heterocyclylalkylamino groups including heteroarylalkylamino groups such as, but not limited to substituted and unsubstituted thiazolylalkylamino groups, benzimidazolylalkylamino groups such as, but not limited to N-methylbenzimidazolylalkylamino groups and the like, imidazolylalkylamino groups such as, but not limited to phenylimidazolylalkylamino groups, ethylmethylimidazolylalkylamino groups, and the like, substituted and unsubstituted quinolinyllalkylamino groups, such as, but not limited to substituted and unsubstituted quinolinylmethylamino groups and the like, such as, but not limited to alkoxyquinolinylmethylamino groups and the like, such as, but not limited to substituted and unsubstituted 4-alkoxy-2-quinolinylmethylamino groups and the like, and furanylalkylamino groups, and the like.

In another embodiment of the seventh group of compounds, Z^1-Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -F.

In another embodiment of the seventh group of compounds, Z^1-Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -Cl.

In another embodiment of the seventh group of compounds, Z^1-Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is -OMe.

In another embodiment of the seventh group of compounds, Z^1-Z^4 , R^1 , and R^2 have any of the values in previous embodiments, and R^3 is a substituted and unsubstituted $-C(=O)N(H)$ -alkyl-heterocyclyl groups where the heterocyclyl

WO 03/004488

PCT/US02/20844

-209-

group of the $-C(=O)N(H)$ -alkyl-heterocyclyl groups is selected from the group consisting of morpholinyl, piperazinyl, and piperidinyl groups.

- In another embodiment of the seventh group of compounds, Z^2-Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is H. In some such embodiments, R^8 is also H.

In another embodiment of the seventh group of compounds, Z^2-Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is $-CH_3$.

- In another embodiment of the seventh group of compounds, Z^2-Z^4 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^1 is C, and R^5 is morpholine.

In another embodiment of the seventh group of compounds, Z^1-Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is H.

- In another embodiment of the seventh group of compounds, Z^1-Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is $-CH_3$.

- In another embodiment of the seventh group of compounds, Z^1-Z^3 , R^1 , R^2 , and R^3 have any of the values in previous embodiments, Z^4 is C, and R^8 is morpholine.

- In another embodiment of the seventh group of compounds, at least one of R^6 or R^7 is selected from the group consisting of piperidinyl substituted piperidinyl groups such as 4-piperidinylpiperidinyl groups or the like, 4-hydroxymethylpiperidinyl groups, 3-dimethylaminomethylpyrrolidinyl groups, 3-alkyl substituted piperazinyl groups, 3,5-dialkyl substituted piperazinyl groups, N-hydroxyethylpiperazinyl groups, N-hydroxymethylpiperazinyl groups, N-hydroxypropylpiperazinyl groups, N-methyl substituted 1,4-diazacycloheptyl

WO 03/004488

PCT/US02/20844

-210-

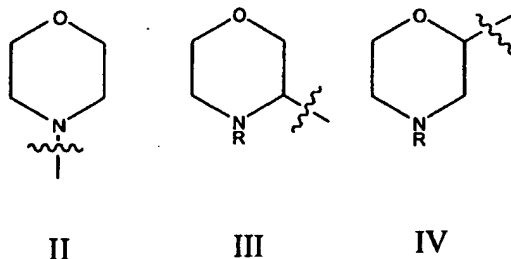
groups, N-ethylpiperazinyl groups, N-isopropylpiperazinyl groups, N-sec-butylpiperazinyl groups, unsubstituted piperazinyl groups, N-(2-pyridyl)piperazinyl groups, N-(3-pyridyl)piperazinyl groups, N-(4-pyridyl)piperazinyl groups, N(H)-CH₂-pyridyl groups, imidazolyl groups, unsubstituted morpholinyl groups, 3-alkylmorpholinyl groups, 3,5-dialkylmorpholinyl groups, 2-dimethylaminopyrrolidinyl groups, 2-methyl-4-dialkylaminopyrrolidinyl groups, 4-hydroxypiperidinyl groups, 4-aryl piperidinyl groups, 4-hydroxy-4-phenylpiperidinyl groups, cyclohexylpiperazinyl groups, cyclopentylpiperazinyl groups, N-methyl substituted diazabicycloalkane groups, -N(CH₃)(N-alkyl(4-piperidinyl)) groups, piperazinyl groups further substituted with a -C(=O)-methyl group on one of the N atoms of the piperazinyl group, -N(H)CH₂CH₂CH₂-imidazolyl groups, -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, -N(H)CH₂CH₂CH₂-morpholinyl groups, -N(H)CH₂CH₂CH₂-piperazinyl groups, -N(H)CH₂CH₂CH₂-piperidinyl groups, and -N(H)CH₂CH₂CH₂-pyridyl groups. In some such embodiments, at least one of R⁶ or R⁷ is selected from the group consisting of 4-piperidinylpiperidinyl groups, 4-hydroxymethylpiperidinyl groups, 3-dimethylaminomethylpyrrolidinyl groups, 3,5-dimethyl substituted piperazinyl groups, N-methyl substituted 1,4-diazacycloheptyl groups, N-(2-pyridyl)piperazinyl groups, N(H)-CH₂-(4-pyridyl) groups, imidazolyl groups, unsubstituted morpholinyl groups, 3-methylmorpholinyl groups, 3,5-dimethylmorpholinyl groups, 2-dimethylaminopyrrolidinyl groups, 2-methyl-4-dimethylaminopyrrolidinyl groups, 4-hydroxy-4-phenylpiperidinyl groups, cyclohexylpiperazinyl groups, N-methyl substituted diazabicycloalkane groups, -N(CH₃)(N-methyl(4-piperidinyl)) groups, piperazinyl groups further substituted with a -C(=O)-methyl group on one of the N atoms of the piperazinyl group, -N(H)CH₂CH₂CH₂-imidazolyl groups, -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, -N(H)CH₂CH₂CH₂-morpholinyl groups, -N(H)CH₂CH₂CH₂-piperazinyl groups, -N(H)CH₂CH₂CH₂-piperidinyl groups, and -N(H)CH₂CH₂CH₂-pyridyl groups.

WO 03/004488

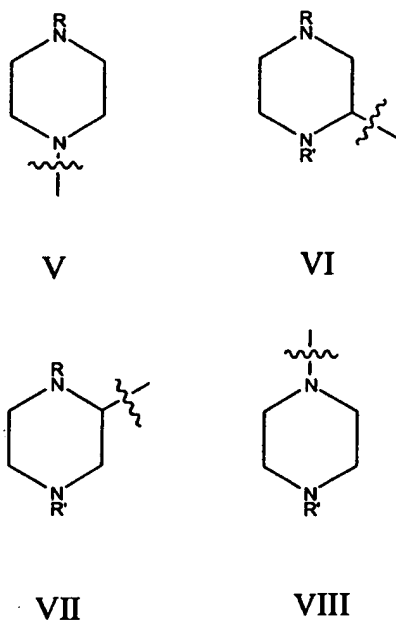
PCT/US02/20844

-211-

The heterocyclic groups of the present invention may be attached in various ways. For example, where R^6 is a heterocyclyl group such as morpholine, the morpholine may be attached to Z^2 as shown below in Structures II, III, and IV.



5 As a further example, where R^6 is a piperazine group, the piperazine may be attached to Z^2 as shown below in Structures V, VI, VII, and VIII.



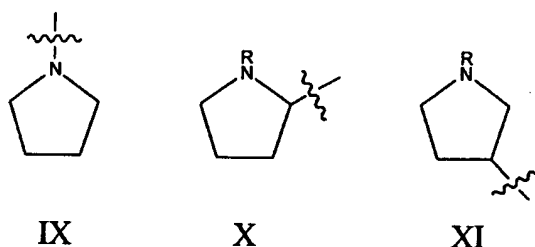
As a further example, where R^6 is a pyrrolidinyl group, then the pyrrolidinyl group may be attached to Z^2 as shown below in structures IX, X, and XI.

10 XI.

WO 03/004488

PCT/US02/20844

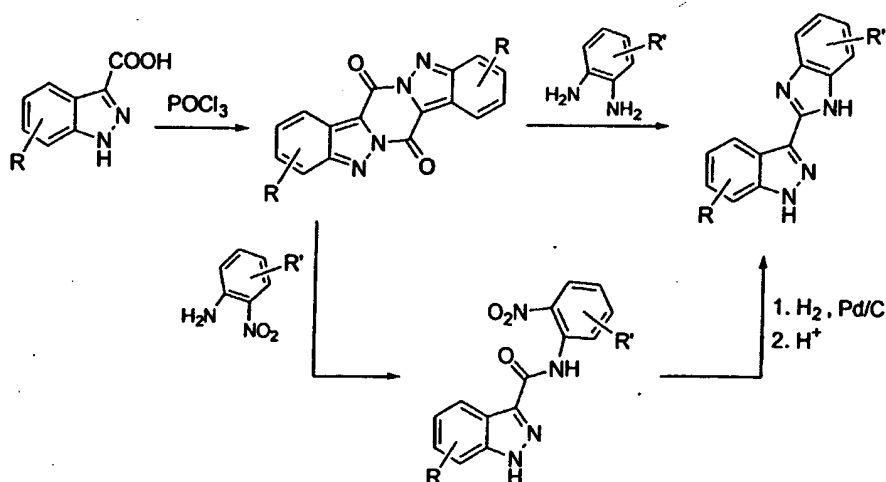
-212-



The indazole benzimidazoles of the present invention may generally be assembled by coupling a suitably substituted indazole fragment with a suitably substituted 2-amino aniline or 2-nitro aniline compound. In one method, shown in Scheme 1, an indazole-3-carboxylic acid is reacted with POCl_3 to form a dimer. The resulting dione is then heated in the presence of a suitably substituted diamine to form the desired indazole benzimidazole adduct. If a nitro aniline is used in place of the diamine, an additional reduction and cyclodehydration step is required to effect the ring closure. Alternatively a diamine having one protected amine group may be reacted in place of the diamine. Formation of the indazole benzimidazole by this procedure will include a deprotection and cyclodehydration to afford the desired indazole benzimidazole compound. These reactions may be conducted in aromatic solvents such as toluene and non-nucleophilic bases such as trialkylamines such as triethylamine may be employed.

15

Scheme 1



WO 03/004488

PCT/US02/20844

-213-

Therefore, according to one embodiment, the invention provides a method for synthesizing a substituted or unsubstituted indazole benzimidazole. The method includes: (a) reacting a dimer formed from two molecules of an indazole-3-carboxylic acid, wherein the six membered benzene ring of the indazole-3-carboxylic acid may be substituted or unsubstituted, with an amino compound selected from the group consisting of:

(i) a diaminobenzene derivative comprising a benzene ring and at least two amine groups bonded to adjacent carbon atoms in the benzene ring, wherein the benzene ring may be further substituted or may comprise 1,2-diaminobenzene, and further wherein the substituted or unsubstituted indazole benzimidazole is formed by reaction with the dimer;

(ii) a nitroaminobenzene derivative comprising a benzene ring, at least one nitro group, and at least one amine group, wherein the at least one amine group is bonded to a carbon atom in the benzene ring that is adjacent to another carbon atom in the benzene ring to which the at least one nitro group is bonded, further wherein the benzene ring may be further substituted or may comprise 1-amino-2-nitrobenzene, and further wherein an amide comprising a nitro group is formed by reaction with the dimer;

(iii) a first (protected amino)(amino)benzene derivative comprising a benzene ring, at least one protected amine group, and at least one -NH₂ group, wherein the at least one protected amine group is bonded to a first carbon atom in the benzene ring that is adjacent to a second carbon atom in the benzene ring to which the at least one -NH₂ group is bonded, further wherein the benzene ring may be further substituted or may only include H atoms bonded to the four other carbon atoms of the benzene ring, and further wherein an amide comprising at least one protected amine group is formed by reaction with the dimer; and

(iv) a second (protected amino)(amino)benzene derivative comprising a benzene ring, at least one protected amine group, and at least one

WO 03/004488

PCT/US02/20844

-214-

-NH₂ group, wherein the at least one protected amine group is bonded to a first carbon atom in the benzene ring that is adjacent to a second carbon atom in the benzene ring to which the at least one -NH₂ group is bonded, further wherein the benzene ring may be further substituted or may only include H atoms bonded to the

5 four other carbon atoms of the benzene ring, further wherein the protected amine group comprises a protecting group that is removed during the reaction with the dimer such that the substituted or unsubstituted indazole benzimidazole is formed by the reaction with the dimer,

wherein, if the dimer is reacted with the nitroaminobenzene

10 derivative, the method further comprises (b):

(b) reducing the nitro group of the amide comprising the nitro group and cyclodehydrating to form the substituted or unsubstituted indazole benzimidazole;

and further wherein, if the dimer is reacted with the first (protected

15 amino)(amino)benzene derivative, then the method further comprises (c):

(c) removing the protecting group from the amide comprising the at least one protected amine group and cyclodehydrating to form the substituted or unsubstituted benzimidazole.

In some embodiments, the dimer is reacted with the diaminobenzene

20 derivative, the nitroaminobenzene derivative, the first (protected amino)(amino)benzene derivative, or the second (protected amino)(amino)benzene derivative in a toluene solution which may be a refluxing toluene solution in some embodiments. In some embodiments, the the dimer is reacted with the diaminobenzene derivative, the nitroaminobenzene derivative, the first (protected

25 amino)(amino)benzene derivative, or the second (protected amino)(amino)benzene derivative at a temperature of greater than 85°C whereas in other embodiments, the temperature ranges from about 95°C to about 111°C, from about 95°C to about 105°C, or from about 98°C to about 110°C.

WO 03/004488

PCT/US02/20844

-215-

In some embodiments, the method includes reacting the dimer with a salt such as hydrochloride, hydrobromide, dihydrochloride, dihydrobromide, or the like salt of the diaminobenzene derivative, the nitroaminobenzene derivative, the first (protected amino)(amino)benzene derivative, or the second (protected amino)(amino)benzene derivative. In other embodiments, the diaminobenzene derivative, the nitroaminobenzene derivative, the first (protected amino)(amino)benzene derivative, or the second (protected amino)(amino)benzene derivative is reacted with the dimer in the presence of a base such as, but not limited to, triethylamine, tripropylamine, tributylamine, ethyldipropylamine, propyldiethylamine, or the like.

In some embodiments, the method includes reacting the indazole-3-carboxylic acid with a reagent affecting the conversion of the acid to an acid halide or anhydride such as, but not limited to, cyanuric fluoride, tetramethylfluoroformamidinium hexafluorophosphate, cyanuric chloride, SOCl_2 , PCl_3 , PCl_5 , PBr_3 , PBr_5 , POCl_3 , carbonyl diimidazole/HCl, Oxalyl chloride, and carbodiimides, followed by in situ dimerization.

In some embodiments in which the nitroaminobenzene derivative is reacted with the dimer, the method includes reducing the nitro group of the amide with hydrogen using a hydrogenation catalyst such as, but not limited to, Pd on carbon, Pt on carbon, or the like. In some such embodiments, the catalyst is Pd on carbon. In some such embodiments, the reduced product is cyclodehydrated by treating the reduced product with an acid such as, but not limited to, acetic acid. In some cases the reduced product is cyclodehydrated by treating the reduced product with sodium acetate and acetic acid and heating such as at a reflux temperature. In some embodiments in which the first (protected amino)(amino)benzene derivative is reacted with the dimer, cyclodehydrating includes reacting the amine formed by removal of the protecting group with an acid such as, but not limited to, acetic acid. In some cases the amine formed by removal of the protecting group is cyclodehydrated by treating the reduced product with sodium acetate and acetic acid

WO 03/004488

PCT/US02/20844

-216-

and heating such as at a reflux temperature. In some cases, the amide comprising the protected amine group formed by reaction of the first (protected amino)(amino)benzene derivative with the dimer is removed and the product is cyclodehydrated, in one procedure, using an acid. Most commonly used protective groups for amines are stable to the reaction with the dimer. Boc may come off during the reaction with the dimer, but only if the temperature is maintained at from 130-150°C or higher. Examples of protective groups for the amines that are stable upon reaction with the dimer include, but are not limited to, carbamates such as, but not limited to, methyl ethyl, t-butyl, benzyl, and 9-fluorenylmethyl carbamates and the like; amides such as, but not limited to, acetamide, chloroacetamide, trifluoroacetamide, benzamide and the like; sulfonamides such as, but not limited to, benzenesulfonamide, p-toluenesulfonamide, trifluoromethanesulfonamide, and the like; and groups such as, but not limited to, N-allyl, N-benzyl, N-o-nitrobenzyl, N-p-methoxybenzyl, N-2,4-dimethoxybenzyl, N-triphenylmethyl, SEM, and the like.

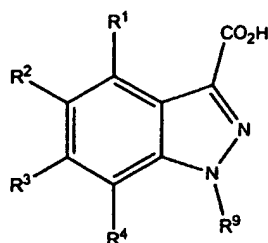
Groups which are sensitive to acids such as, but not limited to, N-2,4-dimethoxybenzyl, N-triphenylmethyl, may come off during cyclodehydration when it is performed in refluxing AcOH. If the cyclodehydration is performed in the presence of a non nucleophilic base such as triethylamine, some carbamates such as, but not limited to, 9-fluorenylmethyl carbamate and 2,4-dichlorobenzyl carbamate may be cleaved.

In some embodiments, the indazole-3-carboxylic acid used to form the dimer has the formula XII where R¹, R², R³, R⁴, and R⁹ have any of the values set forth above with respect to the first, second, third, fourth, fifth, sixth, and seventh group of compounds having the formula I. Compound XII has the following structure.

WO 03/004488

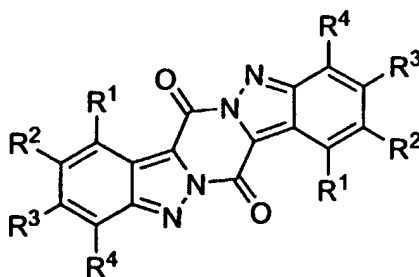
PCT/US02/20844

-217-



XII

In some embodiments, the dimer is a compound having the formula XIII where R^1 , R^2 , R^3 , and R^4 have any of the values set forth above with respect to the first, second, third, fourth, fifth, sixth, and seventh group of compounds having the formula I. With respect to the indazole-3-carboxylic acid of formula XII and the dimer of formula XIII, one skilled in the art will recognize that certain nucleophilic R^1 through R^4 groups may need to be protected with suitable protecting groups prior to formation of the dimer or prior to reaction with the the diaminobenzene derivative, the nitroaminobenzene derivative, the first (protected amino)(amino)benzene derivative, or the second (protected amino)(amino)benzene derivative. Compound of formula XIII have the following structure.



XIII

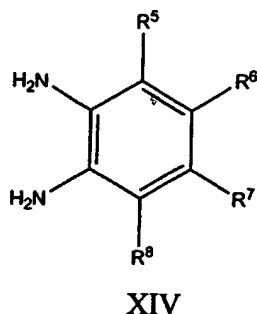
In some embodiments in which the diaminobenzene derivative is reacted with the dimer, the diaminobenzene derivative is a compound having the formula XIV where R^5 , R^6 , R^7 , and R^8 have any of the values set forth above with respect to the first, second, third, fourth, fifth, sixth, and seventh group of compounds having the formula I. One skilled in the art will recognize that certain nucleophilic R^5 through R^8 groups may need to be protected with suitable protecting

WO 03/004488

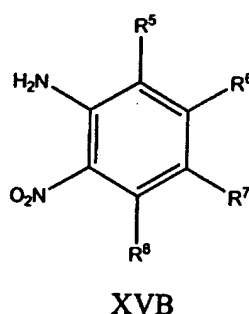
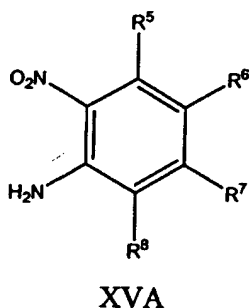
PCT/US02/20844

-218-

groups for reaction with the dimer. Compounds of formula XIV has the following structure.



- In some embodiments in which the nitroaminobenzene derivative is reacted with the dimer, the diaminobenzene derivative is a compound having the formula XVA or XVB where R^5 , R^6 , R^7 , and R^8 have any of the values set forth above with respect to the first, second, third, fourth, fifth, sixth, and seventh group of compounds having the formula I. One skilled in the art will recognize that certain nucleophilic R^5 through R^8 groups may need to be protected with suitable protecting groups for reaction with the dimer. Compounds of formula XVA and XVB have the following structures.



- The indazole fragment may also be constructed from suitably substituted indoles *via* a nitrosation reaction to form a suitably substituted indazole-3-carbaldehyde as the key coupling precursor (Scheme 2). This strategy affords considerable flexibility in the synthesis of functionalized indazole benzimidazoles. By using appropriately substituted indole, 1,2-diaminobenzene, or 1,2-diaminoheteroaryl starting materials, many of which are commercially available or

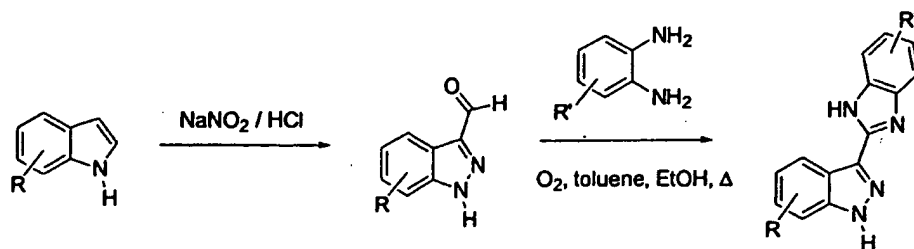
WO 03/004488

PCT/US02/20844

-219-

- may be easily made by one of skill in the art, a wide variety of desired indazole benzimidazole compounds may be synthesized. Without being bound to hypothesis, it is believed that a hemiaminal intermediate compound is initially obtained which is then cyclooxidized to provide the substituted and unsubstituted indazole benzimidazole compounds of the invention. The suitably substituted indazole-3-carbaldehyde may alternatively be reacted with a suitably substituted monoprotected substituted or unsubstituted 1,2-diaminobenzene to form an imine that includes the protecting group. The intermediate imine product may then be deprotected and oxidatively cyclized to produce the desired indazole benzimidazole product. The suitably substituted indazole-3-carbaldehyde may also be reacted with a suitably substituted benzene bearing at least two amine groups one of which is protected with a suitable protecting group that provides a protected benzimidazole indazole product. Removal of the protecting group in such embodiments affords the indazole benzimidazole product. In another embodiment, the indazole-3-carbaldehyde may be reacted with a monoprotected substituted or unsubstituted 1,2-diaminobenzene derivative in a reaction in which the protecting group is lost and the indazole benzimidazole is formed. Generally, the O_2 for the oxidative cyclization step comes from that dissolved in the solvent in the reaction vessel. In one alternative embodiment, O_2 may be bubbled through the reaction mixture. In other embodiments, compounds which provide a source for O_2 such as nitrobenzene may be used in the oxidative cyclization to form the indazole benzimidazole product.

Scheme 2



In one embodiment, the invention provides a first alternative method for synthesizing a substituted or unsubstituted indazole benzimidazole. The method includes reacting a substituted or unsubstituted indazole-3-carbaldehyde with an amino compound selected from the group consisting of:

- 5 (i) a diaminobenzene derivative comprising a benzene ring and at least two amine groups bonded to adjacent carbon atoms in the benzene ring, wherein the benzene ring may be further substituted or may comprise 1,2-diaminobenzene, and further wherein the substituted or unsubstituted indazole benzimidazole is formed by reaction with the substituted or unsubstituted indazole-3-carbaldehyde;
- 10
- (ii) a first (protected amino)(amino)benzene derivative comprising a benzene ring, at least one protected amine group, and at least one -NH₂ group, wherein the at least one protected amine group is bonded to a first carbon atom in the benzene ring that is adjacent to a second carbon atom in the benzene ring to which the at least one -NH₂ group is bonded, further wherein the benzene ring may be further substituted or may only include H atoms bonded to the four other carbon atoms of the benzene ring, and further wherein a N-protected substituted or unsubstituted indazole benzimidazole is formed by reaction with the substituted or unsubstituted indazole-3-carbaldehyde;
- 15
- (iii) a second (protected amino)(amino)benzene derivative comprising a benzene ring, at least one protected amine group, and at least one -NH₂ group, wherein the at least one protected amine group is bonded to a first carbon atom in the benzene ring that is adjacent to a second carbon atom in the benzene ring to which the at least one -NH₂ group is bonded, further wherein the benzene ring may be further substituted or may only include H atoms bonded to the four other carbon atoms of the benzene ring, and further wherein an imine comprising at least one protected amine group is formed by reaction with the substituted or unsubstituted indazole-3-carbaldehyde; and
- 20
- 25

WO 03/004488

PCT/US02/20844

-221-

(iv) a third (protected amino)(amino)benzene derivative comprising a benzene ring, at least one protected amine group, and at least one -NH₂ group, wherein the at least one protected amine group is bonded to a first carbon atom in the benzene ring that is adjacent to a second carbon atom in the benzene ring to which the at least one -NH₂ group is bonded, further wherein the benzene ring may be further substituted or may only include H atoms bonded to the four other carbon atoms of the benzene ring, further wherein the protected amine group comprises a protecting group that is removed during the reaction with the substituted or unsubstituted indazole-3-carbaldehyde such that the substituted or unsubstituted indazole benzimidazole is formed by the reaction with the substituted or unsubstituted indazole-3-carbaldehyde,

wherein, if the substituted or unsubstituted indazole-3-carbaldehyde is reacted with the first (protected amino)(amino)benzene derivative, the method further comprises (b):

(b) removing the protecting group from the N-protected substituted or unsubstituted indazole benzimidazole to form the substituted or unsubstituted indazole benzimidazole;

and further wherein, if the substituted or unsubstituted indazole-3-carbaldehyde is reacted with the second (protected amino)(amino)benzene derivative, then the method further comprises (c):

(c) removing the protecting group from the imine comprising the at least one protected amine group and oxidatively cyclizing to form the substituted or unsubstituted benzimidazole.

In other embodiments, the diaminobenzene derivative, the first (protected amino)(amino)benzene derivative, the second (protected amino)(amino)benzene derivative, or the third (protected amino)(amino)benzene derivative is reacted with the indazole-3-carbaldehyde in the presence of a base such

WO 03/004488

PCT/US02/20844

-222-

as, but not limited to, triethylamine, tripropylamine, tributylamine, ethyldipropylamine, propyldiethylamine, or the like.

In some embodiments of the first alternative methods, the method includes reacting the indazole-3-carbaldehyde with the diaminobenzene derivative, the first (protected amino)(amino)benzene derivative, the second (protected amino)(amino)benzene derivative, or the third (protected amino)(amino)benzene derivative in an aromatic solvent such as toluene, an alcohol solvent such as ethanol, or a combination of these such as a 3:1 toluene ethanol mixture. In other embodiments, the diaminobenzene derivative, the first (protected amino)(amino)benzene derivative, the second (protected amino)(amino)benzene derivative, or the third (protected amino)(amino)benzene derivative is reacted with the indazole-3-carbaldehyde at a temperature of greater than 85°C whereas in other embodiments, the temperature ranges from about 95°C to about 111°C, from about 95°C to about 105°C, or from about 98°C to about 110°C.

In some embodiments in which the first (protected amino)(amino)benzene derivative is reacted with the indazole-3-carbaldehyde to produce the N-protected indazole benzimidazole, the protected amino group is protected with a protecting group such as Bn, SEM, and the like. In some embodiments in which the second (protected amino)(amino)benzene derivative is reacted with the indazole-3-carbaldehyde to produce the imine, the protected amino group is protected with a protecting group such as Fmoc, Boc, and the like. In some embodiments in which the third (protected amino)(amino)benzene derivative is reacted with the indazole-3-carbaldehyde to produce the indazole benzimidazole, the protected amino group is protected with a protecting group such as TMS, TES, and the like.

In some embodiments, the indazole-3-carbaldehyde used to form the indazole benzimidazole is a compound having the formula XVI where R¹, R², R³, and R⁴ have any of the values set forth above with respect to the first, second, third,

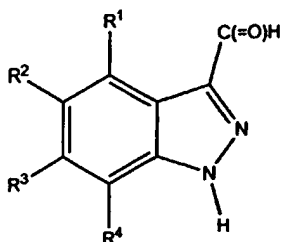
WO 03/004488

PCT/US02/20844

-223-

fourth, fifth, sixth, and seventh group of compounds having the formula I.

Compound XVI has the following structure.



XVI

In some embodiments in which the diaminobenzene derivative is
5 reacted with the indazole-3-carbaldehyde, the diaminobenzene derivative is a
compound having the formula XIV as set forth above where R⁵, R⁶, R⁷, and R⁸ have
any of the values set forth above with respect to the first, second, third, fourth,
fifth, sixth, and seventh group of compounds having the formula I. One skilled in
the art will recognize that certain nucleophilic R⁵ through R⁸ groups may need to be
10 protected with suitable protecting groups for reaction with the indazole-3-
carbaldehyde. In addition, certain R¹-R⁴ groups such as -OH may require
protection during reaction of the substituted indole with NaNO₂/HCl and during
reaction with the diamine in toluene. Groups such as -OH may be protected with a
suitable protecting groups such as Cbz which may then be removed after the
15 indazole-3-carbaldehyde has been reacted with the diamine. Such transformation
are well within the realm of those skilled in the art.

In some embodiments of the first alternative method of forming a
substituted or unsubstituted indazole benzimidazole, the indazole-3-carbaldehyde,
such as compounds of formula XVI, are formed by reacting a suitably substituted
20 indole with NaNO₂. In such procedures, the reaction is generally conducted in the
dark. The reaction may be protected from light by, for example, covering the
reaction vessel with an opaque material such as aluminum foil or the like. In such
procedures, a substituted or unsubstituted indole is generally added to a reaction
vessel that includes an aqueous solution of NaNO₂ at an acidic pH such as at a pH

WO 03/004488

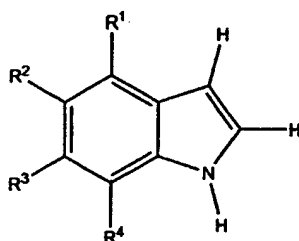
PCT/US02/20844

-224-

ranging from at or about 2 to a pH of at or about 3. In one embodiment, the pH is at or about 2.5. The NaNO_2 solution is generally made acidic by adding an acid such as HCl or HBr although other acids may be employed for this purpose. An organic solvent such as dioxane or tetrahydrofuran may be added to the aqueous

5 NaNO_2 solution along with the indole or prior to adding the indole. Generally, the indole is added slowly to the reaction vessel that contains the NaNO_2 solution. Suitable indoles for use in the synthesis of the indazole-3-carbaldehydes typically are compounds having the formula XVII where R^1 through R^4 have any of the values set forth above with respect to the first, second, third, fourth, fifth, sixth, and seventh

10 groups of compound of formula I. Compounds of formula XVII have the following structure.



XVII

A wide variety of indoles are commercially available for use in preparing the indazole-3-carbaldehydes of formula XVI. Examples of R^1 groups in

15 commercially available indoles include, but are not limited to, -H, -F, -Cl, -CH₃, -CF₃, -OMe, -CO₂Me, -CO₂Et, -OBn, -C≡N, and the like. Examples of R^2 groups of commercially available indoles include, but are not limited to, -H, -F, -Cl, -Br, -OMe, -CF₃, and the like. Examples of R^3 groups of commercially available indoles include, but are not limited to, -H, -F, -Cl, -OMe, -OBn, -CF₃, -C≡N, and

20 the like. Examples of R^4 groups of commercially available indoles include, but are not limited to, -H, -F, -Cl, -Br, -Et, -OMe, -CO₂Me, -CO₂Et, -OBn, -NO₂, and the like.

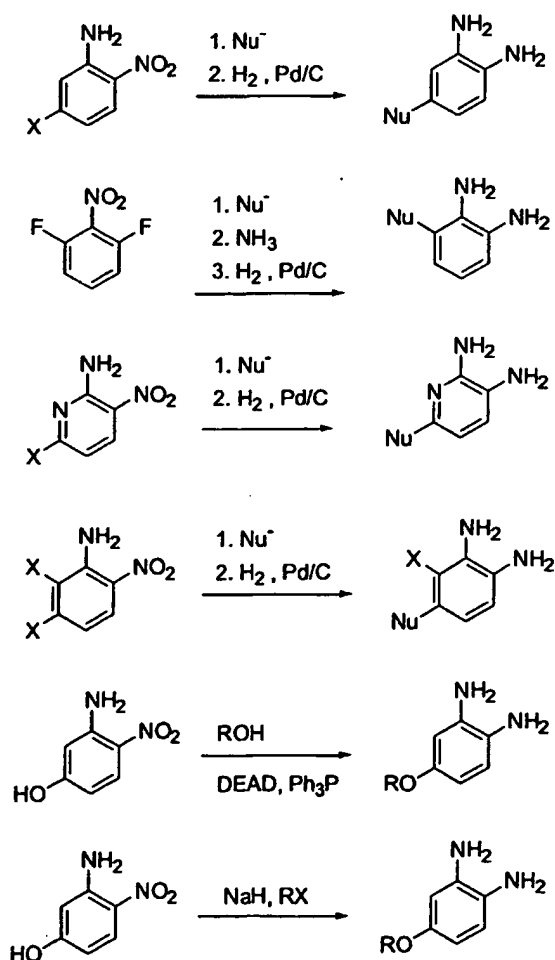
WO 03/004488

PCT/US02/20844

-225-

Scheme 3 illustrates just a few of the methods that may be used to produce a variety of 1,2-diamino benzenes. Halo (X = halogen) nitroanilines may be reacted with a wide variety of nucleophiles (Nu⁻) such as alcohols and amines to produce functionalized nitroanilines which may subsequently be reduced to diamines. The alcohol moiety of a nitroamino phenol may be modified using known methods to introduce a broad range of substituents into a diamine for subsequent inclusion in an indazole benzimidazole compound.

Scheme 3



10

In addition to the above schemes, it should be noted that various groups, including, but not limited to, hydroxyl groups and amine groups may be

WO 03/004488

PCT/US02/20844

-226-

introduced into the indazole benzimidazole compounds of the present invention as protected groups using traditional protecting group chemistry. The use of standard protecting groups and the removal of such groups is well known in the art and various such groups may be used to prepare compounds in accordance with the
5 present invention.

The instant invention also provides for compositions which may be prepared by mixing one or more compounds of the instant invention, or pharmaceutically acceptable salts or tautomers thereof, with pharmaceutically acceptable carriers, excipients, binders, diluents or the like to treat or ameliorate a
10 variety of disorders related to the activity of VEGF-RTK, more particularly angiogenesis associated with cancer or related to the activity of KDR, Flt-1, Flk-1, bFGFR, GSK-3, NEK-2, CHK-1, cdc 2, Tie-2, and PDGF. The compositions of the inventions may be used to create formulations and to inhibit tyrosine kinases and serine/threonine kinases. Such compositions can be in the form of, for example,
15 granules, powders, tablets, capsules, syrup, suppositories, injections, emulsions, elixirs, suspensions or solutions. The instant compositions can be formulated for various routes of administration, for example, by oral administration, by nasal administration, by rectal administration, subcutaneous injection, intravenous injection, intramuscular injections, or intraperitoneal injection. The following
20 dosage forms are given by way of example and should not be construed as limiting the instant invention.

For oral, buccal, and sublingual administration, powders, suspensions, granules, tablets, pills, capsules, gelcaps, and caplets are acceptable as solid dosage forms. These can be prepared, for example, by mixing one or more
25 compounds of the instant invention, or pharmaceutically acceptable salts or tautomers thereof, with at least one additive such as a starch or other additive. Suitable additives are sucrose, lactose, cellulose sugar, mannitol, maltitol, dextran, starch, agar, alginates, chitins, chitosans, pectins, tragacanth gum, gum arabic, gelatins, collagens, casein, albumin, synthetic or semi-synthetic polymers or

WO 03/004488

PCT/US02/20844

-227-

glycerides. Optionally, oral dosage forms can contain other ingredients to aid in administration, such as an inactive diluent, or lubricants such as magnesium stearate, or preservatives such as paraben or sorbic acid, or anti-oxidants such as ascorbic acid, tocopherol or cysteine, a disintegrating agent, binders, thickeners, buffers, sweeteners, flavoring agents or perfuming agents. Tablets and pills may be further treated with suitable coating materials known in the art.

Liquid dosage forms for oral administration may be in the form of pharmaceutically acceptable emulsions, syrups, elixirs, suspensions, and solutions, which may contain an inactive diluent, such as water. Pharmaceutical formulations and medicaments may be prepared as liquid suspensions or solutions using a sterile liquid, such as, but not limited to, an oil, water, an alcohol, and combinations of these. Pharmaceutically suitable surfactants, suspending agents, emulsifying agents, may be added for oral or parenteral administration.

As noted above, suspensions may include oils. Such oil include, but are not limited to, peanut oil, sesame oil, cottonseed oil, corn oil and olive oil. Suspension preparation may also contain esters of fatty acids such as ethyl oleate, isopropyl myristate, fatty acid glycerides and acetylated fatty acid glycerides. Suspension formulations may include alcohols, such as, but not limited to, ethanol, isopropyl alcohol, hexadecyl alcohol, glycerol and propylene glycol. Ethers, such as but not limited to, poly(ethyleneglycol), petroleum hydrocarbons such as mineral oil and petrolatum; and water may also be used in suspension formulations.

For nasal administration, the pharmaceutical formulations and medicaments may be a spray or aerosol containing an appropriate solvent(s) and optionally other compounds such as, but not limited to, stabilizers, antimicrobial agents, antioxidants, pH modifiers, surfactants, bioavailability modifiers and combinations of these. A propellant for an aerosol formulation may include compressed air, nitrogen, carbon dioxide, or a hydrocarbon based low boiling solvent.

WO 03/004488

PCT/US02/20844

-228-

Injectable dosage forms generally include aqueous suspensions or oil suspensions which may be prepared using a suitable dispersant or wetting agent and a suspending agent. Injectable forms may be in solution phase or in the form of a suspension, which is prepared with a solvent or diluent. Acceptable solvents or vehicles include sterilized water, Ringer's solution, or an isotonic aqueous saline solution. Alternatively, sterile oils may be employed as solvents or suspending agents. Preferably, the oil or fatty acid is non-volatile, including natural or synthetic oils, fatty acids, mono-, di- or tri-glycerides.

For injection, the pharmaceutical formulation and/or medicament may be a powder suitable for reconstitution with an appropriate solution as described above. Examples of these include, but are not limited to, freeze dried, rotary dried or spray dried powders, amorphous powders, granules, precipitates, or particulates. For injection, the formulations may optionally contain stabilizers, pH modifiers, surfactants, bioavailability modifiers and combinations of these.

For rectal administration, the pharmaceutical formulations and medicaments may be in the form of a suppository, an ointment, an enema, a tablet or a cream for release of compound in the intestines, sigmoid flexure and/or rectum. Rectal suppositories are prepared by mixing one or more compounds of the instant invention, or pharmaceutically acceptable salts or tautomers of the compound, with acceptable vehicles, for example, cocoa butter or polyethylene glycol, which is present in a solid phase at normal storing temperatures, and present in a liquid phase at those temperatures suitable to release a drug inside the body, such as in the rectum. Oils may also be employed in the preparation of formulations of the soft gelatin type and suppositories. Water, saline, aqueous dextrose and related sugar solutions, and glycerols may be employed in the preparation of suspension formulations which may also contain suspending agents such as pectins, carbomers, methyl cellulose, hydroxypropyl cellulose or carboxymethyl cellulose, as well as buffers and preservatives.

WO 03/004488

PCT/US02/20844

-229-

Besides those representative dosage forms described above, pharmaceutically acceptable excipients and carries are generally known to those skilled in the art and are thus included in the instant invention. Such excipients and carriers are described, for example, in "Remingtons Pharmaceutical Sciences"

5 Mack Pub. Co., New Jersey (1991), which is incorporated herein by reference.

The formulations of the invention may be designed to be short-acting, fast-releasing, long-acting, and sustained-releasing as described below. Thus, the pharmaceutical formulations may also be formulated for controlled release or for slow release.

10 The instant compositions may also comprise, for example, micelles or liposomes, or some other encapsulated form, or may be administered in an extended release form to provide a prolonged storage and/or delivery effect. Therefore, the pharmaceutical formulations and medicaments may be compressed into pellets or cylinders and implanted intramuscularly or subcutaneously as depot injections or as

15 implants such as stents. Such implants may employ known inert materials such as silicones and biodegradable polymers.

Specific dosages may be adjusted depending on conditions of disease, the age, body weight, general health conditions, sex, and diet of the subject, dose intervals, administration routes, excretion rate, and combinations of drugs. Any of

20 the above dosage forms containing effective amounts are well within the bounds of routine experimentation and therefore, well within the scope of the instant invention.

A therapeutically effective dose may vary depending upon the route of administration and dosage form. The preferred compound or compounds of the instant invention is a formulation that exhibits a high therapeutic index. The

25 therapeutic index is the dose ratio between toxic and therapeutic effects which can be expressed as the ratio between LD_{50} and ED_{50} . The LD_{50} is the dose lethal to 50% of the population and the ED_{50} is the dose therapeutically effective in 50% of

WO 03/004488

PCT/US02/20844

-230-

the population. The LD₅₀ and ED₅₀ are determined by standard pharmaceutical procedures in animal cell cultures or experimental animals.

“Treating” within the context of the instant invention, means an alleviation of symptoms associated with a disorder or disease, or halt of further progression or worsening of those symptoms, or prevention or prophylaxis of the disease or disorder. For example, within the context of treating patients in need of an inhibitor of VEGF-RTK, successful treatment may include a reduction in the proliferation of capillaries feeding a tumor or diseased tissue, an alleviation of symptoms related to a cancerous growth or tumor, proliferation of capillaries, or diseased tissue, a halting in capillary proliferation, or a halting in the progression of a disease such as cancer or in the growth of cancerous cells. Treatment may also include administering the pharmaceutical formulations of the present invention in combination with other therapies. For example, the compounds and pharmaceutical formulations of the present invention may be administered before, during, or after surgical procedure and/or radiation therapy. The compounds of the invention can also be administered in conjunction with other anti-cancer drugs including those used in antisense and gene therapy. Appropriate combinations can be determined by those of skill in the oncology and medicine arts.

Pharmaceutical formulations and medicaments according to the invention include any of the compounds described above in combination with a pharmaceutically acceptable carrier. Thus, the compounds of the invention may be used to prepare medicaments and pharmaceutical formulations. In some such embodiments, the medicaments and pharmaceutical formulations comprise any of the compounds of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I or pharmaceutically acceptable salts thereof. The invention also provides for the use of any of the compounds of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I or pharmaceutically acceptable salts thereof for the inhibition of an enzyme such as flt-1 (VEGFR1), KDR

WO 03/004488

PCT/US02/20844

-231-

(VEGFR2), Flk-1, bFGFR, GSK-3, CHK-1, NEK-2, cdc 2, or for the treatment of a disease or condition associated with any of these enzymes as described in greater detail below. The invention also provides the use of any of the compounds of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I or pharmaceutically acceptable salts thereof for the manufacture of enzyme inhibition agent such as a tyrosine kinase inhibitor or a serine/threonine kinase inhibitor, a pharmaceutical formulation, or a medicament that inhibits enzymes such as flt-1 (VEGFR1), KDR (VEGFR2), Flk-1, bFGFR, GSK-3, CHK-1, NEK-2, cdc 2, PDGF, and Tie-2 or treats a disease or condition associated with any of these enzymes as described in greater detail below.

A method of treating a patient in need of an inhibitor of vascular endothelial growth factor receptor tyrosine kinase includes administering an effective amount of a pharmaceutical formulation, a medicament according to the invention or any of the compounds of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I to a patient in need thereof.

A method for inhibiting tumor growth in a patient includes administering an effective amount of the compound, a pharmaceutically acceptable salt thereof of any of the of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I, or a medicament to a patient having a tumor.

A method for inhibiting angiogenesis and tumor growth in a patient includes administering an effective amount of the compound or a pharmaceutically acceptable salt thereof according to a patient in need.

The invention provides a method of treating a subject with various tumor types. The method includes administering to the subject, such as a human subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds or a pharmaceutically

WO 03/004488

PCT/US02/20844

-232-

acceptable salt thereof of formula I to the subject. In some such embodiments, the method includes a method of treating a cancer patient.

The invention provides a method of inhibiting an enzyme such as a serine/threonine kinase. The method includes administering to a subject, such as a human subject, a mammalian subject, or a cell subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds or a pharmaceutically acceptable salt thereof of formula I to the subject. In some such embodiments, the serine/threonine kinase is GSK-3. In other such embodiments, the serine/threonine kinase is CHK-1. In other such embodiments, the serine/threonine kinase is NEK-2.

The invention provides a method of inhibiting an enzyme such as a tyrosine kinase. The method includes administering to a subject, such as a human subject, a mammalian subject, or a cell subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds or a pharmaceutically acceptable salt thereof of formula I to the subject. In some such embodiments, the tyrosine kinase is VEGF.

The invention provides a method of treating a subject with type II diabetes. The method includes administering to the subject, such as a human subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds or a pharmaceutically acceptable salt thereof of formula I to the subject. In some such embodiments, the method includes a method of treating a prediabetic or diabetic patient.

The invention provides a method of stimulating insulin-dependent processes in a patient. The method includes administering to the patient, such as a human patient, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof, to the subject. In some such embodiments, the method includes a method of reducing plasma glucose levels,

WO 03/004488

PCT/US02/20844

-233-

increasing glycogen uptake, potentiating insulin, upregulating glucose synthase activity, and stimulating glycogen synthesis such as in skin, muscle, and fat cells.

The invention provides a method of treating a subject with Alzheimer's disease. The method includes administering to the subject, such as a
5 human subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof, to the subject. In some such embodiments, the method includes reducing tau hyperphosphorylation, reducing the generation of neurofibrillary tangles, and slowing the progression of Alzheimer's
10 disease.

The invention provides a method of treating a subject with a central nervous system disorder. The method includes administering to the subject, such as a human subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I,
15 or a pharmaceutically acceptable salt thereof, to the subject. In some such embodiments, the method includes a method of treating bipolar disorder; increasing the survival of neurons subjected to aberrantly high levels of excitation induced by glutamate; reducing neurodegeneration associated with acute damage such as in cerebral ischemia, traumatic brain injury, and bacterial injury; and reducing chronic
20 neuronal damage associated with Alzheimer's disease, Huntington's disease, Parkinson's disease, AIDS associated dementia, amyotrophic lateral sclerosis (AML) and multiple sclerosis.

The invention provides a method of prolonging an immune response in a subject. The method includes administering to the subject, such as a human
25 subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof, to the subject. In some such embodiments, the method includes prolonging and/or potentiating immunostimulatory effects of

WO 03/004488

PCT/US02/20844

-234-

cytokines, and enhancing the potential of cytokines for immunotherapy such as tumor immunotherapy.

The invention provides a method of reducing the splitting of centrosomes in the cells of a subject. The method includes administering to the
5 subject, such as a human subject, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof, to the subject. In some such embodiments, the subject is a cancer patient.

The invention provides a method of blocking DNA repair in a cancer
10 cell of a cancer patient. The method includes administering to the patient, such as a human patient, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof, to the patient..

The invention provides a method of promoting phosphorylation of
15 cdc25 and Wee1 in a patient. The method includes administering to the patient, such as a human patient, a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof, to the patient.

The invention provides a method of modulating and/or preventing cell
20 cycle arrest in a cell. The method includes contacting the cell with a compound according to any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh group of compounds of formula I, or a pharmaceutically acceptable salt thereof. In one method, the cells are defective in the p53 gene and/or have p53 mutations and/or are deficient in p53. In some embodiments, the cells are cancer
25 cells such as those deficient in p53. In some embodiments, arrest at the G2/M checkpoint is prevented or inhibited. In some embodiments, the method includes treating a patient, such as a human patient with any of the compounds of the invention, and in some such further embodiments, the method further includes

WO 03/004488

PCT/US02/20844

-235-

treating the patient with another therapeutic agent such as a chemotherapeutic agent or with radiation or heat.

A method of preparing pharmaceutical formulations and medicaments includes mixing any of the above-described compounds with a pharmaceutically
5 acceptable carrier.

The present invention, thus generally described, will be understood more readily by reference to the following examples, which are provided by way of illustration and are not intended to be limiting of the present invention.

WO 03/004488

PCT/US02/20844

-236-

EXAMPLES

Nomenclature for the Example compounds was provided using ACD Name version 5.07 software (November 14, 2001) available from Advanced Chemistry Development, Inc., ChemInnovation NamExpert + Nomenclator™ brand software available from ChemInnovation Software, Inc., and AutoNom version 2.2 available in the ChemOffice® Ultra software package version 7.0 available from CambridgeSoft Corporation (Cambridge, MA). Some of the compounds and starting materials were named using standard IUPAC nomenclature.

The following abbreviations are used throughout the application with respect to chemical terminology:

	AcOH:	Acetic acid
	ATP:	Adenosine triphosphate
	BINAP:	2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl
	Boc:	N-tert-Butoxycarbonyl
15	Bn:	Benzyl
	BSA:	Bovine Serum Albumin
	Cbz:	Carbobenzyloxy
	DEAD:	Diethyl azodicarboxylate
	DIEA:	Diisopropylethylamine
20	DMA:	<i>N,N</i> -Dimethylacetamide
	DMAP:	4-Dimethylaminopyridine
	DMF:	<i>N,N</i> -Dimethylformamide
	DMSO:	Dimethylsulfoxide
	dppf:	1,1'-(diphenylphosphino)ferrocene
25	DTT:	DL-Dithiothreitol
	ED ₅₀ :	Dose therapeutically effective in 50% of the population
	EDC or EDCI:	1-(3-Dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride
	EDTA:	Ethylene diamine tetraacetic acid

WO 03/004488

PCT/US02/20844

-237-

	EtOAc:	Ethyl acetate
	EtOH:	Ethanol
	Fmoc:	9-fluorenylmethyl
5	HBTU:	O-Benzotriazol-1-yl-N,N,N',N'-tetramethyluronium hexafluorophosphate
	HPLC:	High Pressure Liquid Chromatography
	IC ₅₀ value:	The concentration of an inhibitor that causes a 50 % reduction in a measured activity.
	KHMDS:	Potassium bis(trimethylsilyl)amide
10	LC/MS:	Liquid Chromatography/Mass Chromatography
	LiHMDS:	Lithium bis(trimethylsilyl)amide
	MeOH:	Methanol
	NMP:	N-methylpyrrolidone
	Pd(dba) ₂ :	Bis(dibenzylideneacetone)Palladium
15	PPTS:	Pyridinium <i>p</i> -toluenesulfonate
	Pyr:	Pyridine
	SEMCl:	2-(Trimethylsilyl)ethoxymethyl chloride
	TBAF:	Tetrabutylammonium fluoride
	TEA:	Triethylamine
20	TES:	Triethylsilyl
	TFAA:	Trifluoroacetic anhydride
	THF:	Tetrahydrofuran
	TMS:	Trimethylsilyl

Purification and Characterization of Compounds

25 Compounds of the present invention were characterized by high performance liquid chromatography (HPLC) using a Waters Millenium chromatography system with a 2690 Separation Module (Milford, Massachusetts). The analytical columns were Alltima C-18 reversed phase, 4.6 x 250 mm from Alltech (Deerfield, Illinois). A gradient elution was used, typically starting with 5%
30 acetonitrile/95% water and progressing to 100% acetonitrile over a period of 40 minutes. All solvents contained 0.1% trifluoroacetic acid (TFA). Compounds were

WO 03/004488

PCT/US02/20844

-238-

detected by ultraviolet light (UV) absorption at either 220 or 254 nm. HPLC solvents were from Burdick and Jackson (Muskegan, Michigan), or Fisher Scientific (Pittsburg, Pennsylvania). In some instances, purity was assessed by thin layer chromatography (TLC) using glass or plastic backed silica gel plates, such as, for example, Baker-Flex Silica Gel 1B2-F flexible sheets. TLC results were readily detected visually under ultraviolet light, or by employing well known iodine vapor and other various staining techniques.

Mass spectrometric analysis was performed on one of two LCMS instruments: a Waters System (Alliance HT HPLC and a Micromass ZQ mass spectrometer; Column: Eclipse XDB-C18, 2.1 x 50 mm; Solvent system: 5-95% acetonitrile in water with 0.05% TFA; Flow rate 0.8 mL/min; Molecular weight range 150-850; Cone Voltage 20 V; Column temperature 40°C) or a Hewlett Packard System (Series 1100 HPLC; Column: Eclipse XDB-C18, 2.1 x 50 mm; Solvent system: 1-95% acetonitrile in water with 0.05% TFA; Flow rate 0.4 mL/min; Molecular weight range 150-850; Cone Voltage 50 V; Column temperature 30°C). All masses are reported as those of the protonated parent ions.

GCMS analysis was performed on a Hewlett Packard instrument (HP6890 Series gas chromatograph with a Mass Selective Detector 5973; Injector volume: 1 µL; Initial column temperature: 50°C; Final column temperature: 250°C; Ramp time: 20 minutes; Gas flow rate: 1 mL/min; Column: 5% Phenyl Methyl Siloxane, Model #HP 190915-443, Dimensions: 30.0 m x 25 µm x 0.25 µm).

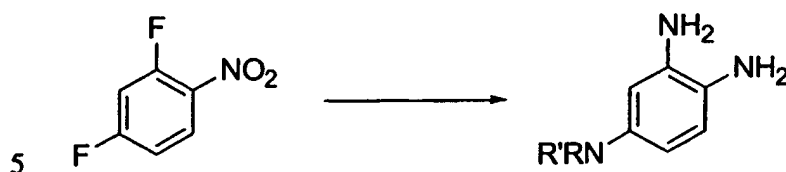
Preparative separations were carried out using either a Flash 40 chromatography system and KP-Sil, 60A (Biotage, Charlottesville, Virginia), or by HPLC using a C-18 reversed phase column. Typical solvents employed for the Flash 40 Biotage system were dichloromethane, methanol, ethyl acetate, hexane and triethyl amine. Typical solvents employed for the reverse phase HPLC were varying concentrations of acetonitrile and water with 0.1% trifluoroacetic acid.

WO 03/004488

PCT/US02/20844

-239-

Various functionalized aryl diamines were obtained from commercial sources, prepared by methods known to those of skill in the art, or were prepared by the following general methods:

METHOD 1

10 2,4-Difluoronitrobenzene (1.0 equivalent) was placed in a dry round-bottomed flask equipped with a dry ice condenser charged with acetone and dry ice. Ammonia was condensed into the flask and the resulting solution was stirred at reflux for 7 hours. A yellow precipitate formed within 1 hour. After 7 hours, the condenser was removed and the liquid ammonia was allowed to evaporate over several hours. The crude product was purified by flash chromatography on silica gel (85:15 hexanes:ethyl acetate, product at $R_f = 0.32$, contaminant at $R_f = 0.51$); GC/MS (m/z) 156.1 (M^+), R_t 11.16 minutes.

15 The resulting 5-fluoro-2-nitrophenylamine (1.0 equivalent) and an amine (1.1 equivalents) e.g. N-methyl piperazine, were dissolved in N-methylpyrrolidinone and triethylamine (2.0 equivalents) was added. The reaction mixture was heated at 100°C for 3 hours. The solution was then cooled to room temperature and diluted with water. The resulting precipitate was filtered and dried under vacuum to provide the 2-amino-4-dialkylamino nitrobenzene or 4-

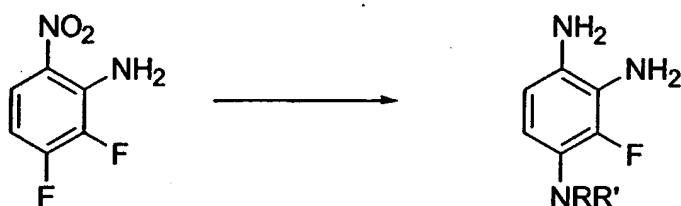
20 dialkylamino nitroaniline. Alternatively, the same product may be obtained by the reaction of commercially available 5-chloro-2-nitrophenylamine (1.0 equivalent) and an amine (5 equivalents; neat). The two are heated at 130°C for 1-2 days and the product is isolated in an identical manner. LC/MS (m/z) 237.1 (MH^+), R_t 1.304 minutes.

WO 03/004488

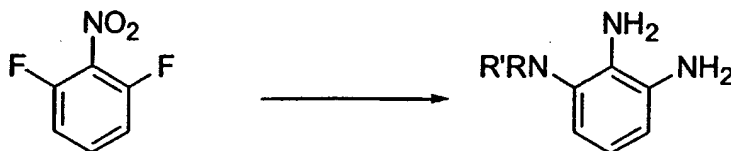
PCT/US02/20844

-240-

The nitroamine (1.0 equivalent) and 10% Pd/C (0.1 equivalents) were suspended in anhydrous ethanol at room temperature. The reaction flask was evacuated and subsequently filled with H₂. The resulting mixture was then stirred under a hydrogen atmosphere overnight. The resulting solution was filtered through Celite and concentrated under vacuum to provide the crude product which was used without further purification.

METHOD 2

A round bottom flask was charged with 2,3-difluoro-6-nitrophenylamine (1 equivalent) and enough NMP to make a viscous slurry. An amine (5 equivalents), e.g. N-methyl piperazine, was added and the solution was heated at 100°C. After 2 hours, the solution was cooled and poured into water. A bright yellow solid formed which was filtered and dried. The nitroamine was reduced as in Method 1 to provide the crude product which was used without further purification. LC/MS (m/z) 225.1 (MH⁺), R_t 0.335 minutes.

METHOD 3

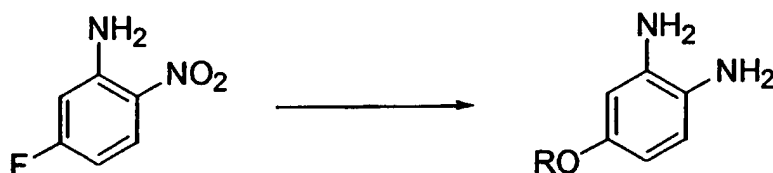
To a 0.1 M DMF solution of 1,3-difluoro-2-nitrobenzene was added Et₃N (2 equivalents) followed by an amine (1 equivalent), e.g. morpholine. The mixture was stirred for 18 hours and then diluted with water and extracted with ethyl acetate. The combined organic layers were dried over MgSO₄, filtered, and

WO 03/004488

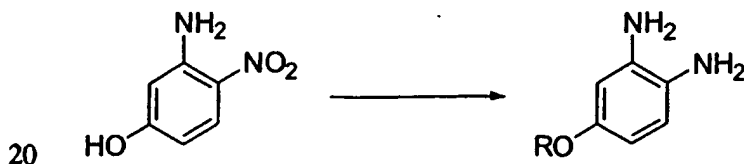
PCT/US02/20844

-241-

concentrated. LC/MS (m/z): 227.2 (MH⁺), R_t 2.522 minutes. Ammonia was condensed into a bomb containing the crude product. The bomb was sealed and heated to 100°C (over 400 psi). After 72 hours the bomb was allowed to cool and the ammonia was evaporated to provide a reddish solid. The nitroamine was reduced as in Method 1 to provide the crude product which was used without further purification. LC/MS (m/z) 194.1 (MH⁺), R_t 1.199 minutes.

METHOD 4

To a stirred N-methylpyrrolidinone solution containing NaH (1.3 equivalents) was added an alcohol (1.0 equivalent), e.g. 2-methoxyethanol. The resulting mixture was then stirred for 30 minutes. A slurry of 5-fluoro-2-nitrophenylamine in N-methylpyrrolidinone was then added slowly. The mixture was then heated to 100°C. After 2 hours, the reaction mixture was cooled and water was added. The mixture was then filtered and the solid was washed with water and purified by silica gel chromatography (1:1 ethyl acetate:hexane). LC/MS (m/z) 213.2 (MH⁺), R_t 2.24 minutes. The nitroamine was reduced as in Method 1 to provide the crude product which was used without further purification. LC/MS (m/z) 183.1 (MH⁺), R_t 0.984 minutes.

METHOD 5

Diisopropyl azodicarboxylate (1.1 equivalents) was added dropwise to a stirred solution of 4-amino-3-nitrophenol (1.0 equivalent), triphenylphosphine

WO 03/004488

PCT/US02/20844

-242-

(1.1 equivalents), and an alcohol, e.g. N-(2-hydroxyethyl)morpholine (1.0 equivalent), in tetrahydrofuran at 0°C. The mixture was allowed to warm to room temperature and stirred for 18 hours. The solvent was evaporated, and the product was purified by silica gel chromatography (98:2 CH₂Cl₂:methanol) to yield 4-(2-morpholin-4-ylethoxy)-2-nitrophenylamine as a dark reddish-brown oil. LC/MS (m/z) 268.0 (MH⁺), R_t 1.01 minutes. The nitroamine was reduced as in Method 1 to give the crude product which was used without further purification. LC/MS (m/z) 238.3 (MH⁺), R_t 0.295 minutes.

METHOD 6

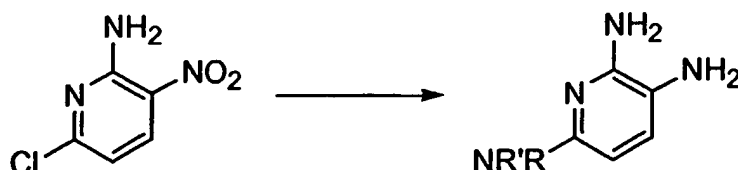
To a flask charged with 4-amino-3-nitrophenol (1 equivalent), K₂CO₃ (2 equivalents), and 2-butanone was added an alkyl dibromide, e.g. 1,3-dibromopropane (1.5 equivalents). The resulting mixture was then heated at 80°C for 18 hours. After cooling, the mixture was filtered, concentrated, and diluted with water. The solution was then extracted with CH₂Cl₂ (3 x) and the combined organic layers were concentrated to give a solid that was then washed with pentane. LC/MS (m/z) 275.1 (MH⁺), R_t 2.74 minutes.

An acetonitrile solution of the bromide prepared above, an amine, e.g. pyrrolidine (5 equivalents), Cs₂CO₃ (2 equivalents) and Bu₄NI (0.1 equivalents) was heated at 70°C for 48 hours. The reaction mixture was cooled, filtered, and concentrated. The residue was dissolved in CH₂Cl₂, washed with water, and concentrated to give the desired nitroamine, e.g. 2-nitro-4-(3-pyrrolidin-1-ylpropoxy)phenylamine. LC/MS (m/z) 266.2 (MH⁺), R_t 1.51 minutes. The nitroamine was reduced as in Method 1 to provide the crude product which was used without further purification.

WO 03/004488

PCT/US02/20844

-243-

METHOD 7

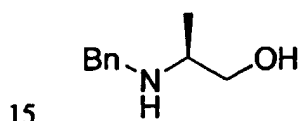
To a suspension of 6-chloro-3-nitropyridin-2-amine (1 equivalent) in acetonitrile was added an amine, e.g. morpholine (4 equivalents). The resulting
5 reaction mixture was stirred at 70°C for 5 hours. The solvent was evaporated under reduced pressure, and the residue triturated with ether to provide the desired compound as a bright yellow powder. LC/MS (m/z) 225.0 (MH⁺), R_t 1.79 minutes. The nitroamine was reduced as in Method 1 to provide the crude product which was used without further purification.

10

METHOD 8

Synthesis of {[[(5S,2R)-4-(3-Amino-4-nitrophenyl)-5-methylmorpholin-2-yl]methyl}dimethylamine and {[[(5S,2R)-4-(3,4-diaminophenyl)-5-methylmorpholin-2-yl]methyl}dimethylamine

Step 1. Synthesis of (2S)-[benzylamino]propan-1-ol



15

A mixture of (2S)-2-amino propanol (1.2 equivalents), benzaldehyde (1 equivalent), NaHCO₃ (1.5 equivalents) and MeOH, was heated at reflux for 4 hours and then cooled to 0°C. Sodium borohydride (5.0 equivalents) was then added over 1 hour while the reaction was vigorously stirred. The reaction mixture was
20 stirred at room temperature for 4 hours and then filtered over Celite. The filtrate was concentrated, and the residue was dissolved in CH₂Cl₂. The solution was washed successively with water (x2) and brine (x1). The organic extracts were

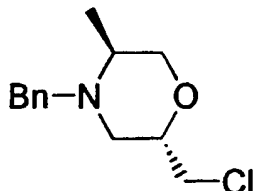
WO 03/004488

PCT/US02/20844

-244-

collected and dried over Na_2SO_4 . The solvent was evaporated to give the desired product as a white solid. GC/MS : 134 (100%, $\text{M}^+ - \text{CH}_2\text{OH}$), $R_t = 11.57$ minutes.

Step 2. Synthesis of (2S,5S)-2-(chloromethyl)-5-methyl-4-benzylmorpholine



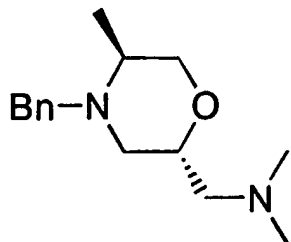
- 5 A mixture of (2S)-2-[benzylamino]propan-1-ol (1 equivalent) and
epichlorohydrin (1 equivalent) was stirred at room temperature overnight. The
mixture was cooled down to 0°C and cold trifluoromethanesulfonic acid (4
equivalents) was added. The flask was equipped with a reflux condenser and the
mixture was stirred at 160°C overnight. The reaction mixture was cooled to room
10 temperature, diluted with CH_2Cl_2 and quenched with ice water. The mixture was
then made basic ($\text{pH} = 12$) with a 30% NaOH solution. The two phases were
separated, and the aqueous phase was extracted with CH_2Cl_2 . The organic layer was
washed with water, brine, dried over Na_2SO_4 and concentrated to afford a dark
brown oil. The crude product contained an equimolar mixture of (2R,5S)-2-
15 (chloromethyl)-5-methyl-4-benzylmorpholine (*cis* diastereoisomer) and (2S,5S)-2-
(chloromethyl)-5-methyl-4-benzylmorpholine (*trans* diastereoisomer), which were
separated by chromatography on silica gel (ethyl acetate/hexanes 1:20 to 1:8).
(2S,5S)-2-(chloromethyl)-5-methyl-4-benzyl morpholine was obtained as the isomer
with the lower R_t . GC/MS: 239 (15%, M^+), $R_t = 15.08$ minutes; LC/MS (m/z):
20 240.0 (MH^+), R_t 1.56 minutes.

WO 03/004488

PCT/US02/20844

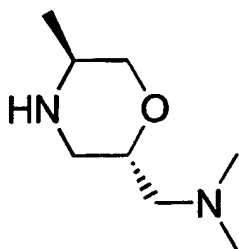
-245-

Step 3. Synthesis of {(5S,2R)-5-methyl-4-benzylmorpholin-2-yl)methyl}-dimethylamine



- A mixture of (2S,5S)-2-(chloromethyl)-5-methyl-4-benzylmorpholine (1 equivalent) and dimethylamine (5 equivalents) in ethanol, was heated at 150°C for 36 hours in a sealed high pressure vessel. The reaction mixture was cooled to room temperature and concentrated under reduced pressure. The residue was taken up in 1 N HCl, and the solution was washed with CH₂Cl₂. The water phase was made basic with a 30% aq. NaOH solution (pH=12) and extracted with CH₂Cl₂. The organic extracts were collected and dried over Na₂SO₄. Evaporation of the solvent under reduced pressure afforded (2S,5S)-2-[dimethylamino(methyl)]-5-methyl-4-benzylmorpholine as a yellow oil. GC/MS: 247 (2%, M-H), 204 (55%, M-NMe₂), R_t= 15.5 min; LC/MS (m/z): 249.2 (MH⁺), R_t 0.72 minutes.

Step 4. Synthesis of [((2S,5S)-5-methylmorpholin-2-yl)methyl]dimethylamine



15

{[(5S,2R)-5-methyl-4-benzylmorpholin-2-yl)methyl]dimethylamine (1 equivalent), was dissolved in EtOH and the solution was transferred to a stainless steel high pressure vessel equipped with a pressure gauge. 10% Pd/C was added (10 wt.%), and the vessel charged with H₂. The reaction mixture was stirred at

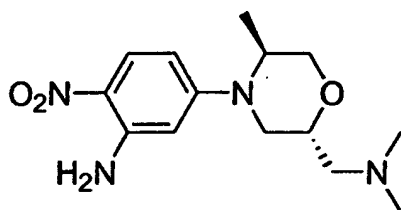
WO 03/004488

PCT/US02/20844

-246-

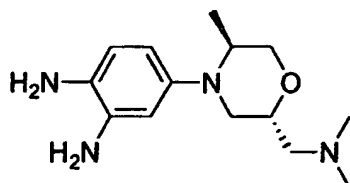
130°C and 200 psi of H₂ overnight. The reaction mixture was cooled to room temperature, filtered over a pad of Celite, and then evaporated. The desired amine was obtained in quantitative yield as a pale yellow oil. GC/MS : 128 (10%, M+ - 2xCH₃), 58 (100%, NHCH₂CHO), R_t = 8.16 minutes.

5 **Step 5. Synthesis of {[[(5S,2R)-4-(3-amino-4-nitrophenyl)-5-methylmorpholin-2-yl]methyl}dimethylamine**



A mixture of 5-fluoro-2-nitroaniline (1.1 equivalents), [(2S,5S)-5-methylmorpholin-2-yl)methyl]dimethylamine (1 equivalent), triethylamine (3
10 equivalents), and N-methylpyrrolidinone was heated at 140°C for 48 hours in a sealed high pressure vessel. The reaction mixture was then cooled to 25 °C and dissolved in CH₂Cl₂. The solution was washed with water (x2) and dried over Na₂SO₄. Purification *via* chromatography on silica gel (10% MeOH in dichloromethane) afforded the desired product as a dark yellow foam. LC/MS (m/z)
15 295.2 (MH⁺) R_t 1.55 minutes.

Step 6. Synthesis of {[[(5S,2R)-4-(3,4-Diaminophenyl)-5-methylmorpholin-2-yl]methyl}dimethylamine



The nitroaniline produced in Step 5 was reduced using the method set
20 forth in Method 1 to provide the crude title compound which was used without further purification.

WO 03/004488

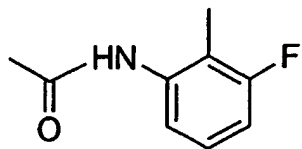
PCT/US02/20844

-247-

METHOD 9

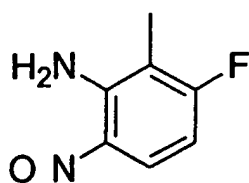
Synthesis of 1,2-diamino-3-methyl-4-fluorobenzene

Step 1. Synthesis of N-(3-fluoro-2-methylphenyl)acetamide



- 5 1-amino-3-fluoro-2-methylbenzene (1 equivalent) was dissolved in CH_2Cl_2 and acetic anhydride (2.0 equivalents) was added slowly. The solution was stirred at room temperature for 4 hours. The reaction mixture was then quenched with water, and the aqueous layer was extracted with ethyl acetate. The organic layer was washed with H_2O , a 10% HCl solution, H_2O , and brine. It was then dried
- 10 over Na_2SO_4 and concentrated *in vacuo*, to yield N-(3-fluoro-2-methylphenyl)acetamide as a pink solid. LC/MS (m/z) 168.2 (MH^+), R_t 1.91 minutes.

Step 2. Synthesis of 1-amino-3-fluoro-2-methyl-6-nitrobenzene

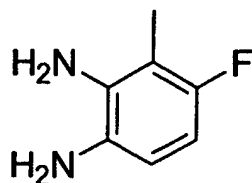


- 15 A mixture of $\text{HNO}_3/\text{H}_2\text{SO}_4$ (1:1, 60% HNO_3 :conc. H_2SO_4) cooled to 0°C was added dropwise to N-(3-fluoro-2-methylphenyl)acetamide to form a 0.16 M solution. The solution was stirred at 0°C for 10 minutes and then at room temperature for 30 minutes. The solution was then diluted with water and made basic ($\text{pH}=10$) by addition of 6 N NaOH . The mixture was then extracted CH_2Cl_2
- 20 (3x), dried over Na_2SO_4 , and concentrated *in vacuo* to yield 1-amino-3-fluoro-2-methyl-6-nitrobenzene (the acetyl group was removed during basic work up). LC/MS (m/z) 171.1 (MH^+), R_t 1.87 minutes.

WO 03/004488

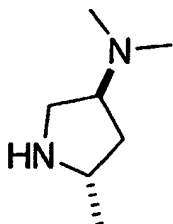
PCT/US02/20844

-248-

Step 3. Synthesis of 1,2-diamino-4-fluoro-3-methylbenzene

Reduction of the nitro group on 1-amino-3-fluoro-2-methyl-6-nitrobenzene was carried out as described in Method 1 to yield the title compound.

- 5 LC/MS (m/z) 141.1 (MH⁺), R_t 0.43 minutes.

METHOD 10**Synthesis of 4-(4-dimethylamino-2-methylpyrrolidin-1-yl)-1,2-diaminobenzene****Step 1. Synthesis of (2S,4S)-4-dimethylamino-2-methylpyrrolidine**

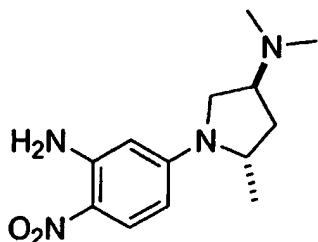
- 10 (2S,4S)-4-dimethylamino-2-methylpyrrolidine was synthesized from the Boc-protected cis-4-hydroxy-D-proline methyl ester (available from Bachem) as described in T. Rosen, D.T.W. Chu, I.M. Lico, P.B. Gernandes, K. Marsh, L. Shen, V.G. Cepa, A.G. Pernet, *J. Med. Chem.*, 1988, 31(8), 1598-1611.

WO 03/004488

PCT/US02/20844

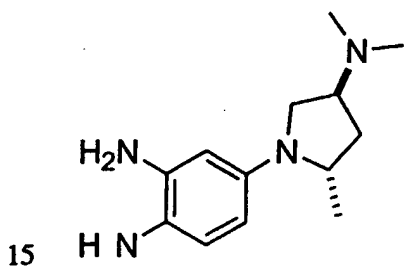
-249-

Step 2. Synthesis of 3-[(2S,4S)-4-dimethylamino-2-methylpyrrolidin-1-yl]-1-amino-6-nitrobenzene



- (2S,4S)-4-dimethylamino-2-methylpyrrolidine (1.0 equivalent) and 1-amino-3-fluoro-6-nitrobenzene (1.2 equivalents) were dissolved in N-methylpyrrolidinone, and Et₃N (5.0 equivalents) was added. The solution was heated for 5 hours at 100°C. The solution was then cooled and diluted with water. The aqueous layer was extracted with ethyl acetate. The organic layer was then washed twice with H₂O, once with brine, dried over Na₂SO₄, filtered, and concentrated. The crude material was purified by column chromatography (1:1 ethyl acetate:hexane to 1:20 MeOH:ethyl acetate to 1:1 MeOH:ethyl acetate to give the title compound as a yellow gum. LC/MS (m/z) 265.2 (MH⁺), R_t 1.65 minutes.

Step 3. Synthesis of 4-[(2S,4S)-4-dimethylamino-2-methylpyrrolidin-1-yl]-1,2-diaminobenzene



3-[(2S,4S)-4-Dimethylamino-2-methylpyrrolidin-1-yl]-1-amino-6-nitrobenzene was reduced as in Method 1 to afford the title compound. LC/MS (m/z) 235.4 (MH⁺), R_t 0.37 minutes.

WO 03/004488

PCT/US02/20844

-250-

EXAMPLE 1**3-(1H-Benzimidazol-2-yl)-1H-indazole****Synthesis of 11a,5a-Dihydro-1H-indazolo[2',3'-2,1]piperazino[4,5-b]1H-indazole-6,12-dione**

5 Indazole-3-carboxylic acid (1.0 equivalents) was dissolved in phosphorus oxychloride (0.05 equivalents) and refluxed. After 4 hours, the mixture was cooled and concentrated *in vacuo*. The resulting dione was washed three times with benzene, dried, and isolated as a red solid. LC/MS (m/z) 289.1 (MH⁺), R_t 2.90 minutes.

10 **Synthesis of 3-(1H-Benzimidazol-2-yl)-1H-indazole**

A toluene solution containing 11a,5a-dihydro-1H-indazolo[2',3'-2,1]piperazino[4,5-b]1H-indazole-6,12-dione (1.0 equivalent) and phenylenediamine (1.5 equivalents), was heated to 100°C. After 18 hours, the solvent was evaporated and the residue was washed repeatedly with water, followed by methanol, and then
15 filtered. Purification by reverse phase preparatory HPLC gave the title compound as a yellow solid. LC/MS (m/z) 235.3 (MH⁺), R_t 1.90 minutes.

EXAMPLE 2**3-(6-Methoxy-1H-benzimidazol-2-yl)-1H-indazole****Procedure 1**

20 A solution of 11a,5a-dihydro-1H-indazolo[2',3'-2,1]piperazino[4,5-b]1H-indazole-6,12-dione (1.0 equivalent) from Example 1 and 4-methoxy-o-phenylenediamine dihydrochloride (1.5 equivalents) in toluene was heated to 100°C. After 36 hours, the solvent was evaporated and the residue was washed repeatedly with water. The filtrate lyophilized, and the recovered material was purified by

WO 03/004488

PCT/US02/20844

-251-

reverse phase HPLC yielding the title compound as a grey solid. LC/MS (m/z) 265.3 (MH⁺), R_t 2.04 minutes.

Procedure 2

A solution containing of 11a,5a-dihydro-1H-indazolo[2',3'-
5 2,1]piperazino[4,5-b]1H-indazole-6,12-dione (1.0 equivalent) from Example 1, and
4-methoxy-o-phenylenediamine dihydrochloride (1.5 equivalents) in toluene was
heated at reflux. After two days, the solvent was evaporated and the residue was
washed repeatedly with water. The filtrate was frozen and lyophilized, and the
recovered material was purified by reverse phase HPLC yielding the title compound
10 as a grey solid. LC/MS (m/z) 265.3 (MH⁺), R_t 2.04 minutes.

EXAMPLE 3

3-{6-[(2R,6S)-2,6-Dimethylmorpholin-4-yl]-1H-benzimidazol-2-yl}-1H-indazole

Synthesis of 1H-Indazol-3-yl-N-[5-((6S,2R)-2,6-dimethylmorpholin-4-yl)-2-nitrophenyl]carboxamide

15 A toluene solution containing 5-[cis-(6S,2R)-2,6-dimethylmorpholin-4-yl]-2-nitroaniline (2.0 equivalents; synthesized following the procedure described in Method 1 starting from 2,6-cis-dimethylmorpholine and omitting the reduction step), 11a,5a-dihydro-1H-indazolo[2',3'-2,1]piperazino[4,5-b]1H-indazole-6,12-dione from Example 1 (1.0 equivalent), and Et₃N (2.1 equivalents) was heated at
20 reflux for two days. The resulting mixture was then cooled and filtered. The crude material was washed with methanol to provide a brown solid LC/MS (m/z) 396.1 (MH⁺), R_t 3.44 minutes.

Synthesis of 1H-Indazol-3-yl-N-[5-((6S,2R)-2,6-dimethylmorpholin-4-yl)-2-aminophenyl]carboxamide

25 To a solution of 1H-indazol-3-yl-N-[5-((6S,2R)-2,6-dimethylmorpholin-4-yl)-2-nitrophenyl]carboxamide (1.0 equivalent) in ethanol was added

WO 03/004488

PCT/US02/20844

-252-

10% Pd/C (0.5 equivalents). The reaction vessel was repeatedly purged with nitrogen, and then the reaction was stirred under a hydrogen atmosphere (1 atm) for 18 hours. The product was filtered through Celite with ethanol. The solvent was removed to provide a brown solid which was used without purification. LC/MS
5 (m/z) 366.2 (MH⁺), R_t 2.19 minutes.

Synthesis of 3-{6-[(2R,6S)-2,6-Dimethylmorpholin-4-yl]-1H-benzimidazol-2-yl}-1H-indazole

1H-Indazol-3-yl-N-[5-((6S,2R)-2,6-dimethyl-morpholin-4-yl)-2-aminophenyl]carboxamide (1.0 equivalent) was dissolved in acetic acid, and sodium
10 acetate (1.1 equivalents) was added. The solution was heated at reflux for 1 hour and then cooled. The acetic acid was removed, and the residue was triturated with ethyl acetate and filtered. The filtrate was concentrated to provide a green foam which was purified by reverse phase HPLC. LC/MS (m/z) 348.1 (MH⁺), R_t 2.23 minutes.

15

EXAMPLE 4

5-Chloro-3-(5-methyl-1H-benzimidazol-2-yl)-1H-indazole

Procedure 1

A 0.25 M aqueous solution of NaNO₂ (1.0 equivalent) was brought to a pH of 2.5 by the addition of dilute HCl. Dioxane was added to the solution (10%
20 by volume). The flask was protected from light with aluminum foil and 5-chloroindole (1.0 equivalent) was added slowly. The solution was stirred vigorously for 2 hours. The solution was then extracted with three portions of ethyl acetate. The organic layers were combined, washed with water, dried over MgSO₄, filtered, and concentrated. The product was purified by flash chromatography (ethyl
25 acetate:hexane, 1:1, v/v) yielding 5-chloro-1H-indazole-3-carbaldehyde as a purple solid. LC/MS (m/z) 181.3 (MH⁺), R_t 2.7 minutes.

WO 03/004488

PCT/US02/20844

-253-

A flask was charged with 5-chloro-1H-indazole-3-carbaldehyde (1.0 equivalent) and 3,4-diaminotoluene (1.0 equivalent) in toluene and ethanol (approximately 3:1). The flask was heated to 100°C for 18 hours. The solvent was evaporated, and the residue purified by reverse phase HPLC to provide the desired product as a white solid. LC/MS (m/z) 283.1 (MH⁺), R_t 2.5 minutes.

Procedure 2

A 0.05 M solution of NaNO₂ (1.0 equivalent) was brought to a pH of 2.5 with the addition of dilute HCl. The flask was protected from light with foil and 5-chloroindole (1.0 equivalent) was added slowly. The solution was left to stir vigorously for 2 hours. The solution was then filtered and extracted with three portions of ethyl acetate. The organic layers were combined, dried over MgSO₄, filtered, and concentrated. The product was purified by flash chromatography (ethyl acetate:hexane, 1:1, v/v) yielding a purple solid. LC/MS (m/z) 181.3 (MH⁺), R_t 2.7 minutes.

A flask was charged with 5-chloro-1H-indazole-3-carbaldehyde (1.0 equivalent) and 3,4-diaminotoluene (1.0 equivalent) in toluene and EtOH. The reaction mixture was heated to 100°C for 18 hours. The solvent was then evaporated, and the residue was purified by reverse phase HPLC yielding a white solid. LC/MS (m/z) 283.1 (MH⁺), R_t 2.5 minutes.

20

EXAMPLES 5-670

Examples 5-670 were synthesized following the indole modification and coupling procedure of Example 4. The aryl diamine and the indole precursors are readily recognizable by one skilled in the art and are commercially available from Aldrich (Milwaukee, WI) or Acros Organics (Pittsburgh, PA). 5-Fluoro-6-chloroindole, 6-(trifluoromethyl)indole, 6-nitroindole, and 5-carbethoxyindole may be obtained from Biosynth International (Naperville, IL). 5,6-Difluoroindole and 4,6-difluoroindole may be obtained from Asymchem International, Inc. (Durham, NC). 5,6-Methylenedioxyindole may be obtained from Maybridge Chemical

WO 03/004488

PCT/US02/20844

-254-

Company Ltd. (Cornwall, UK). N-(4-Morpholinoethyl)indole-6-carboxamide may be obtained from Peakdale Molecular (High Peak, UK). The preparation for some of the compounds employed is described in the various methods disclosed herein.

Example	Name	LC/MS (m/z) (MH ⁺)
5	3-(5-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	320.1
6	5-chloro-3-{5-[(2R,6S)-2,6-dimethylmorpholin-4-yl]-1H-benzimidazol-2-yl}-1H-indazole	382.1
7	3-{5-[(2R,6S)-2,6-dimethylmorpholin-4-yl]-1H-benzimidazol-2-yl}-5-fluoro-1H-indazole	366.2
8	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	347.2
9	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-5-fluoro-1H-indazole	365.2
10	3-[5-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	362.3
11	5-fluoro-3-[5-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	380.1
12	6-fluoro-3-[5-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	380.1
13	6-chloro-3-[5-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	396.1
14	3-[5-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole-5-carbonitrile	387.2
15	3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole	309.2
16	5-fluoro-3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole	327.2
17	6-fluoro-3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole	327.2
18	3-{5-[(2R,6S)-2,6-dimethylmorpholin-4-yl]-1H-benzimidazol-2-yl}-6-fluoro-1H-indazole	366.3
19	6-chloro-3-{5-[(2R,6S)-2,6-dimethylmorpholin-4-yl]-1H-benzimidazol-2-yl}-1H-indazole	382.3

WO 03/004488

PCT/US02/20844

-255-

20	ethyl {4-[2-(1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperazin-1-yl}acetate	405.3
21	(3S)-1-[2-(1H-indazol-3-yl)-1H-benzimidazol-5-yl]-N,N-dimethylpyrrolidin-3-amine	347.1
22	2-(1H-indazol-3-yl)-5-morpholin-4-yl-1H-imidazo[4,5-b]pyridine	321.3
23	2-(6-fluoro-1H-indazol-3-yl)-5-morpholin-4-yl-1H-imidazo[4,5-b]pyridine	339.1
24	2-(5-methoxy-1H-indazol-3-yl)-5-morpholin-4-yl-1H-imidazo[4,5-b]pyridine	351.3
25	3-(5-morpholin-4-yl-1H-imidazo[4,5-b]pyridin-2-yl)-1H-indazole-5-carbonitrile	346.3
26	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(1H-indazol-3-yl)-1H-imidazo[4,5-b]pyridine	348.2
27	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(6-fluoro-1H-indazol-3-yl)-1H-imidazo[4,5-b]pyridine	366.2
28	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(5-methoxy-1H-indazol-3-yl)-1H-imidazo[4,5-b]pyridine	378.3
29	3-[6-(pyridin-3-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole	342.2
30	6-fluoro-3-[6-(pyridin-3-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole	359.8
31	6-chloro-5-fluoro-3-[6-(pyridin-3-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole	393.8
32	4,6-difluoro-3-[6-(pyridin-3-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole	377.9
33	3-[6-(pyridin-3-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole-5-carbonitrile	367.1
34	6-fluoro-3-[6-(pyridin-4-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole	360.2
35	4,6-difluoro-3-[6-(pyridin-4-ylmethoxy)-1H-benzimidazol-2-yl]-1H-indazole	377.2
36	1'-[2-(1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	401.3
37	1'-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	419.3
38	1'-[2-(6-chloro-5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	453.3
39	1'-[2-(4,6-difluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	437.2
40	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-	401.3

WO 03/004488

PCT/US02/20844

-256-

	1H-indazole	
41	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-fluoro-1H-indazole	419.3
42	6-chloro-3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-fluoro-1H-indazole	453.3
43	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-4,6-difluoro-1H-indazole	437.2
44	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	361.2
45	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-fluoro-1H-indazole	379.2
46	3-[5-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-4,6-difluoro-1H-indazole	397.2
47	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-chloro-5-fluoro-1H-indazole	413.1
48	2-(1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	362.2
49	2-(6-fluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	379.2
50	2-(4,6-difluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	397.2
51	2-(6-chloro-5-fluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	413.2
52	2-(5-fluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	379.2
53	2-(4-chloro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	395.2
54	2-(4-fluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	379.3
55	3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	345.2
56	6-fluoro-3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	363.2
57	4,6-difluoro-3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.2

WO 03/004488

PCT/US02/20844

-257-

58	6-chloro-5-fluoro-3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	397.2
59	5-fluoro-3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	363.2
60	4-chloro-3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	379.2
61	4-fluoro-3-[6-(5-methyl-2,5-diazabicyclo[2.2.1]hept-2-yl)-1H-benzimidazol-2-yl]-1H-indazole	363.2
62	3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	361.3
63	6-fluoro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	379.3
64	6-chloro-5-fluoro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	413.2
65	5-fluoro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	379.3
66	4-fluoro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	395.2
67	4-fluoro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	379.3
68	5,6-difluoro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	397.2
69	4-{{2-(1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	385.1
70	4-{{2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	415.2
71	4-{{2-(6-chloro-5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	437.1
72	4-{{2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	403.1
73	4-{{2-(4-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	403.1
74	4-{{2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	419.1
75	6-methoxy-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	363.1
76	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	333.1

WO 03/004488

PCT/US02/20844

-258-

77	5-chloro-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	367.1
78	5-fluoro-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	351.1
79	5-methoxy-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	363.1
80	2-(1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	236.1
81	3-[4-chloro-6-(trifluoromethyl)-1H-benzimidazol-2-yl]-1H-indazole	337.1
82	2-(1H-indazol-3-yl)-1H-benzimidazole-6-carboxylic acid	279.1
83	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	378.2
84	methyl 3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	391.1
85	3-(5-fluoro-6-morpholin-4-yl)-1H-benzimidazol-2-yl)-1H-indazole	338.2
86	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carbonitrile	358.4
87	4,6-difluoro-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	369.1
88	6-fluoro-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	351.1
89	6-chloro-5-fluoro-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	385.1
90	5-chloro-3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole	343.2
91	4,6-difluoro-3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole	345.2
92	6-chloro-5-fluoro-3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole	361.1
93	3-[5-(2-methoxyethoxy)-1H-benzimidazol-2-yl]-1H-indazole-5-carbonitrile	334.1
94	1-[2-(6-chloro-5-fluoro-1H-indazol-3-yl)-4-methyl-1H-benzimidazol-5-yl]-N,N-dimethylpyrrolidin-3-amine	353.2
95	1-[2-(5-methoxy-1H-indazol-3-yl)-4-methyl-1H-benzimidazol-5-yl]-N,N-dimethylpyrrolidin-3-amine	391.3
96	1-[2-(1H-indazol-3-yl)-4-methyl-1H-benzimidazol-5-yl]-N,N-dimethylpyrrolidin-3-amine	361.3

WO 03/004488

PCT/US02/20844

-259-

97	1-[2-(6-chloro-5-fluoro-1H-indazol-3-yl)-4-methyl-1H-benzimidazol-5-yl]-N,N-dimethylpyrrolidin-3-amine	413.2
98	3-(5-morpholin-4-yl-1H-imidazo[4,5-b]pyridin-2-yl)-1H-indazole-5-carboxylic acid	365.2
99	2-(4,6-difluoro-1H-indazol-3-yl)-5-morpholin-4-yl-1H-imidazo[4,5-b]pyridine	357.2
100	2-(6-chloro-5-fluoro-1H-indazol-3-yl)-5-morpholin-4-yl-1H-imidazo[4,5-b]pyridine	373.2
101	ethyl 4-[2-(5,6-difluoro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperazine-1-carboxylate	427.2
102	ethyl 4-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperazine-1-carboxylate	409.2
103	ethyl 4-[2-(1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperazine-1-carboxylate	391.2
104	ethyl 4-[2-(4-fluoro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperazine-1-carboxylate	409.2
105	1'-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-5-yl}-1,4'-bipiperidine	507.4
106	1'-[2-(4-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	479.0
107	1'-[2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-5-yl]-1,4'-bipiperidine	415.0
108	1'-[2-(4-fluoro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]-1,4'-bipiperidine	419.0
109	1'-[2-(4-chloro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]-1,4'-bipiperidine	435.0
110	1'-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]-1,4'-bipiperidine	446.0
111	3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	351.0
112	4-fluoro-3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	369.0
113	4-chloro-3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	385.0
114	5-fluoro-3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	369.0
115	6-fluoro-3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	369.0
116	3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-(methyloxy)-1H-indazole	381.0
117	6-chloro-5-fluoro-3-[4-fluoro-5-(4-methylpiperazin-1-yl)-	403.0

WO 03/004488

PCT/US02/20844

-260-

	1H-benzimidazol-2-yl]-1H-indazole	
118	5,6-difluoro-3-[4-fluoro-5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	387.0
119	4-{[2-(4-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]oxy}-N-methylpyridine-2-carboxamide	464.3
120	3-(7-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	320.4
121	4-fluoro-3-(7-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	338.4
122	5-methyl-3-(7-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	334.4
123	5-fluoro-3-(7-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	338.4
124	6-chloro-3-(7-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	354.8
125	5-methoxy-3-(7-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	350.4
126	5,6-difluoro-3-(4-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	356.3
127	6-chloro-5-fluoro-3-(4-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	372.8
128	2-(1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	341.4
129	2-(5-methoxy-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	371.4
130	2-(6-chloro-5-fluoro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	393.8
131	2-(5-fluoro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	359.4
132	2-(4-bromo-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	420.3
133	2-(4-fluoro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	359.4
134	2-(6-chloro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	375.8
135	2-(1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	355.4
136	2-(5-methoxy-1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	385.4
137	2-(6-chloro-5-fluoro-1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	407.9
138	2-(5-fluoro-1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	373.4

WO 03/004488

PCT/US02/20844

-261-

139	2-(4-fluoro-1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	373.4
140	2-(6-chloro-1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	389.9
141	2-(1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	341.4
142	2-(5-methoxy-1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	371.4
143	2-(6-chloro-5-fluoro-1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	393.8
144	2-(5-fluoro-1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	359.4
145	2-(1H-indazol-3-yl)-3H-imidazo[4,5-c]pyridine	236.2
146	2-(6-chloro-5-fluoro-1H-indazol-3-yl)-3H-imidazo[4,5-c]pyridine	288.7
147	2-(5-fluoro-1H-indazol-3-yl)-3H-imidazo[4,5-c]pyridine	254.2
148	2-(6-chloro-1H-indazol-3-yl)-3H-imidazo[4,5-c]pyridine	270.7
149	2-(6-fluoro-1H-indazol-3-yl)-3H-imidazo[4,5-c]pyridine	254.2
150	2-(5-chloro-1H-indazol-3-yl)-3H-imidazo[4,5-c]pyridine	270.7
151	4-fluoro-3-[6-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	380.4
152	5-isopropoxy-3-[6-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	420.5
153	5-methoxy-3-[6-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	392.5
154	5-chloro-3-[6-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	396.9
155	4,6-difluoro-3-[6-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	398.4
156	6-chloro-5-fluoro-3-[6-(3-pyrrolidin-1-ylpropoxy)-1H-benzimidazol-2-yl]-1H-indazole	414.9
157	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(2-morpholin-4-ylethyl)-1H-indazole-6-carboxamide	557.7
158	1'-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	446.5
159	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carbonitrile	426.5
160	methyl 3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	459.6

WO 03/004488

PCT/US02/20844

-262-

161	1'-[2-(5-phenoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-1,4'-bipiperidine	493.6
162	2-(4-fluoro-1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	359.4
163	2-(6-chloro-1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	375.8
164	2-(5-isopropoxy-1H-indazol-3-yl)-N-(pyridin-3-ylmethyl)-1H-benzimidazol-6-amine	399.5
165	8-(5-fluoro-1H-indazol-3-yl)-9H-purine	255.2
166	8-(6-fluoro-1H-indazol-3-yl)-9H-purine	255.2
167	6-bromo-2-(5-methoxy-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	345.2
168	6-bromo-2-(5-fluoro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	333.1
169	6-bromo-2-(4-bromo-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	394.0
170	8-(6-chloro-1H-indazol-3-yl)-6-methyl-9H-purine	285.7
171	8-(5-isopropoxy-1H-indazol-3-yl)-6-methyl-9H-purine	309.3
172	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-N'-ethylurea	487.6
173	1'-[2-(1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridin-5-yl]-1,4'-bipiperidine	402.5
174	1'-[2-(4-bromo-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridin-5-yl]-1,4'-bipiperidine	481.4
175	1'-[2-(5-chloro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridin-5-yl]-1,4'-bipiperidine	437.0
176	1'-[2-(5-nitro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridin-5-yl]-1,4'-bipiperidine	447.5
177	1'-[2-(5-isopropoxy-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridin-5-yl]-1,4'-bipiperidine	460.6
178	8-(1H-indazol-3-yl)-6-methyl-9H-purine	251.3
179	8-(5-methoxy-1H-indazol-3-yl)-6-methyl-9H-purine	281.3
180	8-(5-fluoro-1H-indazol-3-yl)-6-methyl-9H-purine	269.3
181	3-(5-fluoro-4-methyl-1H-benzimidazol-2-yl)-1H-indazole	267.3
182	3-(5-fluoro-4-methyl-1H-benzimidazol-2-yl)-5-methoxy-1H-indazole	297.3
183	3-(5-fluoro-4-methyl-1H-benzimidazol-2-yl)-N-(2-morpholin-4-ylethyl)-1H-indazole-6-carboxamide	423.5

WO 03/004488

PCT/US02/20844

-263-

184	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(5-nitropyridin-2-yl)-1H-indazol-5-amine	538.6
185	1-{1-[2-(1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperidin-4-yl}-1,3-dihydro-2H-benzimidazol-2-one	450.5
186	1-{1-[2-(4-bromo-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperidin-4-yl}-1,3-dihydro-2H-benzimidazol-2-one	529.4
187	1-{1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperidin-4-yl}-1,3-dihydro-2H-benzimidazol-2-one	468.5
188	1-{1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperidin-4-yl}-1,3-dihydro-2H-benzimidazol-2-one	480.5
189	1-{1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]piperidin-4-yl}-1,3-dihydro-2H-benzimidazol-2-one	495.5
190	2-{4-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	381.4
191	2-{4-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	393.5
192	2-{4-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	397.9
193	2-{4-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	408.4
194	methyl 3-{6-[4-(2-hydroxyethyl)piperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	421.5
195	2-{4-[2-(5-isopropoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	421.5
196	2-{4-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	397.9
197	2-{4-[2-(5-ethoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	407.5
198	2-{4-[2-(5-phenoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	455.5
199	2-{4-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperazin-1-yl}ethanol	408.4
200	3-{6-[4-(2-hydroxyethyl)piperazin-1-yl]-1H-benzimidazol-2-yl}-N-(2-morpholin-4-ylethyl)-1H-indazole-6-carboxamide	519.6
201	2-(6-chloro-1H-indazol-3-yl)-N-piperidin-3-yl-1H-benzimidazol-6-amine	367.9
202	2-(6-chloro-1H-indazol-3-yl)-N-[(5R)-5-(methoxymethyl)pyrrolidin-3-yl]-1H-benzimidazol-6-amine	397.9
203	6-chloro-3-{5-[(2S)-2-(pyrrolidin-1-ylmethyl)pyrrolidin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	421.9
204	6-fluoro-3-{5-[(2S)-2-(pyrrolidin-1-ylmethyl)pyrrolidin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	405.5

WO 03/004488

PCT/US02/20844

-264-

205	5-(benzyloxy)-3-{5-[(2S)-2-(pyrrolidin-1-ylmethyl)pyrrolidin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	493.6
206	5-methoxy-3-{5-[(2S)-2-(pyrrolidin-1-ylmethyl)pyrrolidin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	417.5
207	2-(1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-5-amine	355.4
208	2-(5-fluoro-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-5-amine	373.4
209	2-(5-methoxy-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-5-amine	385.4
210	2-(5-chloro-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	389.9
211	2-(5-nitro-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	400.4
212	methyl 3-{6-[(2-pyridin-3-ylethyl)amino]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	413.5
213	2-(5-isopropoxy-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	413.5
214	2-(6-fluoro-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	373.4
215	2-(6-chloro-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	389.9
216	2-(6-methoxy-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	385.4
217	2-(5-ethoxy-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	399.5
218	2-(5-phenoxy-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	447.5
219	2-(6-nitro-1H-indazol-3-yl)-N-(2-pyridin-3-ylethyl)-1H-benzimidazol-6-amine	400.4
220	2-(5-chloro-1H-indazol-3-yl)-N-[3-(1H-imidazol-1-yl)propyl]-1H-benzimidazol-6-amine	392.9
221	N-[3-(1H-imidazol-1-yl)propyl]-2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-amine	388.4
222	N-[3-(1H-imidazol-1-yl)propyl]-2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	403.4
223	methyl 3-(6-{[3-(1H-imidazol-1-yl)propyl]amino}-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	416.5
224	3-(6-{[3-(1H-imidazol-1-yl)propyl]amino}-1H-benzimidazol-2-yl)-1H-indazole-5-carbonitrile	383.4
225	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-[3-(1H-imidazol-1-yl)propyl]-1H-benzimidazol-6-amine	464.5
226	N-[3-(1H-imidazol-1-yl)propyl]-2-(5-isopropoxy-1H-indazol-3-yl)-1H-benzimidazol-6-amine	416.5

WO 03/004488

PCT/US02/20844

-265-

227	2-(6-fluoro-1H-indazol-3-yl)-N-[3-(1H-imidazol-1-yl)propyl]-1H-benzimidazol-6-amine	376.4
228	2-(6-chloro-1H-indazol-3-yl)-N-[3-(1H-imidazol-1-yl)propyl]-1H-benzimidazol-6-amine	392.9
229	2-(5-ethoxy-1H-indazol-3-yl)-N-[3-(1H-imidazol-1-yl)propyl]-1H-benzimidazol-6-amine	402.5
230	N-[3-(1H-imidazol-1-yl)propyl]-2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	403.4
231	2-(1H-indazol-3-yl)-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	363.4
232	2-(5-chloro-1H-indazol-3-yl)-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	397.9
233	2-(5-methoxy-1H-indazol-3-yl)-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	393.5
234	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	469.6
235	2-(6-fluoro-1H-indazol-3-yl)-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	381.4
236	2-(6-chloro-1H-indazol-3-yl)-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	397.9
237	2-(5-ethoxy-1H-indazol-3-yl)-N-(2-morpholin-4-ylethyl)-1H-benzimidazol-6-amine	407.5
238	N-(2-morpholin-4-ylethyl)-2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	408.4
239	5-chloro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	395.9
240	5-bromo-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	440.4
241	3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methoxy-1H-indazole	391.5
242	3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	406.5
243	methyl 3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	419.5
244	5-(benzyloxy)-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	467.6
245	6-chloro-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	395.9
246	3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-methoxy-1H-indazole	391.5
247	5-ethoxy-3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	405.5
248	3-[6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-nitro-1H-indazole	406.5

WO 03/004488

PCT/US02/20844

-266-

249	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(5-fluoro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	366.4
250	2-(5-chloro-1H-indazol-3-yl)-5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-3H-imidazo[4,5-b]pyridine	382.9
251	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(5-nitro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	393.4
252	2-(6-chloro-1H-indazol-3-yl)-5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-3H-imidazo[4,5-b]pyridine	382.9
253	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(6-nitro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridine	393.4
254	2-(5-fluoro-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	408.5
255	2-(5-chloro-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	424.9
256	2-(5-bromo-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	469.4
257	2-(5-methoxy-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	420.5
258	N-[3-(4-methylpiperazin-1-yl)propyl]-2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	435.5
259	methyl 3-(6-{[3-(4-methylpiperazin-1-yl)propyl]amino}-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	448.5
260	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	496.6
261	2-(6-fluoro-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	408.5
262	2-(6-chloro-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	424.9
263	2-(5-ethoxy-1H-indazol-3-yl)-N-[3-(4-methylpiperazin-1-yl)propyl]-1H-benzimidazol-6-amine	434.6
264	N-[3-(4-methylpiperazin-1-yl)propyl]-2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	435.5
265	2-(5-methoxy-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	359.4
266	2-(5-chloro-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	375.8
267	2-(5-methoxy-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	371.4
268	2-(5-nitro-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	386.4
269	methyl 3-{6-[(pyridin-2-ylmethyl)amino]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	399.4
270	2-(6-fluoro-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	359.4

WO 03/004488

PCT/US02/20844

-267-

271	2-(5-ethoxy-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	385.4
272	2-(6-nitro-1H-indazol-3-yl)-N-(pyridin-2-ylmethyl)-1H-benzimidazol-6-amine	386.4
273	2-(5-fluoro-1H-indazol-3-yl)-N-piperidin-3-yl-1H-benzimidazol-5-amine	351.4
274	methyl 3-[5-(piperidin-3-ylamino)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	391.4
275	2-(5,6-difluoro-1H-indazol-3-yl)-N-piperidin-3-yl-1H-benzimidazol-5-amine	369.4
276	3-[5-(piperidin-3-ylamino)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	358.4
277	2-(6-fluoro-1H-indazol-3-yl)-N-piperidin-3-yl-1H-benzimidazol-5-amine	351.4
278	2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazole-6-carboxylic acid	313.7
279	2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazole-6-carboxylic acid	385.4
280	3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	319.4
281	5-chloro-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	353.8
282	5-bromo-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	398.3
283	5-methoxy-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	349.4
284	5-nitro-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	364.4
285	methyl 3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	377.4
286	5-(benzyloxy)-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	425.5
287	5-isopropoxy-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	377.5
288	6-fluoro-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	337.4
289	6-chloro-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	353.8
290	6-methoxy-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	349.4
291	5-ethoxy-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	363.4
292	6-nitro-3-(6-piperazin-1-yl-1H-benzimidazol-2-yl)-1H-indazole	364.4

WO 03/004488

PCT/US02/20844

-268-

293	2-(5-methyl-1H-indazol-3-yl)-N-piperidin-3-yl-1H-benzimidazol-5-amine	347.4
294	1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	352.4
295	1-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	368.8
296	1-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	413.3
297	1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	364.4
298	1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	379.4
299	methyl 3-[6-(4-hydroxypiperidin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	392.4
300	1-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}piperidin-4-ol	440.5
301	1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	352.4
302	1-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	368.8
303	1-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-ol	379.4
304	2-(5-fluoro-1H-indazol-3-yl)-N-(2-piperidin-1-ylethyl)-1H-benzimidazol-6-amine	379.5
305	2-(1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	369.4
306	2-(5-fluoro-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	387.4
307	2-(5-chloro-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	403.9
308	2-(5-methoxy-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	399.5
309	2-(6-fluoro-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	387.4
310	2-(6-chloro-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	403.9
311	2-(6-methoxy-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	399.5
312	2-(5-ethoxy-1H-indazol-3-yl)-N-methyl-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	413.5
313	N-methyl-2-(6-nitro-1H-indazol-3-yl)-N-(2-pyridin-2-ylethyl)-1H-benzimidazol-6-amine	414.4
314	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-N'-(2,4-dimethoxyphenyl)urea	595.7
315	2-(5-chloro-1H-indazol-3-yl)-N-methyl-N-(1-	395.9

WO 03/004488

PCT/US02/20844

-269-

	methylpiperidin-4-yl)-1H-benzimidazol-6-amine	
316	2-(5-bromo-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	440.4
317	2-(5-methoxy-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	391.5
318	N-methyl-N-(1-methylpiperidin-4-yl)-2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	406.5
319	methyl 3-{6-[methyl(1-methylpiperidin-4-yl)amino]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	419.5
320	N-methyl-2-(5-methyl-1H-indazol-3-yl)-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	375.5
321	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	467.6
322	2-(6-chloro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	395.9
323	2-(6-methoxy-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	391.5
324	2-(5-ethoxy-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	405.5
325	N-methyl-N-(1-methylpiperidin-4-yl)-2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	406.5
326	2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	405.5
327	N-methyl-2-(7-methyl-1H-indazol-3-yl)-N-(1-methylpiperidin-4-yl)-1H-benzimidazol-6-amine	375.5
328	N-(1-benzylpiperidin-4-yl)-2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-amine	453.6
329	N-(1-benzylpiperidin-4-yl)-2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	441.5
330	2-(6-chloro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-5-amine	389.9
331	1-[2-(1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	334.4
332	1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	352.4
333	1-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	368.8
334	1-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	413.3
335	1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	364.4
336	1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	379.4
337	methyl 3-[6-(3-hydroxypiperidin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	392.4

WO 03/004488

PCT/US02/20844

-270-

338	1-[2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	348.4
339	1-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}piperidin-3-ol	440.5
340	1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	352.4
341	1-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	368.8
342	1-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	364.4
343	1-[2-(5-ethoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	378.4
344	1-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	379.4
345	1-[2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	378.4
346	1-[2-(7-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-3-ol	348.4
347	(3R)-1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	338.4
348	(3R)-1-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	354.8
349	(3R)-1-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	399.3
350	(3R)-1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	350.4
351	(3R)-1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	365.4
352	(3R)-1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	378.4
353	(3R)-1-[2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	334.4
354	(3R)-1-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}pyrrolidin-3-ol	426.5
355	(3R)-1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	338.4
356	(3R)-1-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	354.8
357	(3R)-1-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	350.4
358	(3R)-1-[2-(5-ethoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	364.4
359	(3R)-1-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	365.4
360	(3R)-1-[2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-1H-	364.4

WO 03/004488

PCT/US02/20844

-271-

	benzimidazol-6-yl]pyrrolidin-3-ol	
361	(3R)-1-[2-(7-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-ol	334.4
362	6-fluoro-3-{6-[(4-methylpiperazin-1-yl)carbonyl]-1H-benzimidazol-2-yl}-1H-indazole	379.4
363	1'-{[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]carbonyl}-1,4'-bipiperidine	447.5
364	6-fluoro-3-[6-(morpholin-4-ylcarbonyl)-1H-benzimidazol-2-yl]-1H-indazole	366.4
365	2-(6-fluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpiperidin-4-yl)-1H-benzimidazole-6-carboxamide	407.5
366	3-(6-{[(2R,6S)-2,6-dimethylmorpholin-4-yl]carbonyl}-1H-benzimidazol-2-yl)-6-fluoro-1H-indazole	394.4
367	2-(6-fluoro-1H-indazol-3-yl)-N-methyl-N-(1-methylpyrrolidin-3-yl)-1H-benzimidazole-6-carboxamide	393.4
368	(3S,5S)-1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]-N,N,5-trimethylpyrrolidin-3-amine	379.5
369	1-[2-(1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	410.5
370	1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	428.5
371	1-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	444.9
372	1-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	489.4
373	1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	440.5
374	1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	455.5
375	methyl 3-[6-(4-hydroxy-4-phenylpiperidin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	468.5
376	1-[2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	424.5
377	1-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}-4-phenylpiperidin-4-ol	516.6
378	1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	428.5
379	1-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	444.9
380	1-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	440.5
381	1-[2-(5-ethoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	454.5
382	1-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	455.5

WO 03/004488

PCT/US02/20844

-272-

383	1-[2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	454.5
384	1-[2-(7-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	424.5
385	1-[2-(7-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-4-phenylpiperidin-4-ol	444.9
386	1-[2-(1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	347.4
387	1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	365.4
388	1-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	381.9
389	1-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	426.3
390	1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	377.5
391	N,N-dimethyl-1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-amine	392.4
392	methyl 3-{6-[3-(dimethylamino)pyrrolidin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	405.5
393	1-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}-N,N-dimethylpyrrolidin-3-amine	453.6
394	1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	365.4
395	1-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	381.9
396	1-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	377.5
397	1-[2-(5-ethoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	391.5
398	N,N-dimethyl-1-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-amine	392.4
399	N,N-dimethyl-1-[2-(7-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-amine	361.5
400	1-[2-(7-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N,N-dimethylpyrrolidin-3-amine	381.9
401	5-fluoro-3-(6-morpholin-4-yl)-1H-benzimidazol-2-yl)-1H-indazole	338.4
402	5-chloro-3-(6-morpholin-4-yl)-1H-benzimidazol-2-yl)-1H-indazole	354.8
403	5-bromo-3-(6-morpholin-4-yl)-1H-benzimidazol-2-yl)-1H-indazole	399.3
404	5-methoxy-3-(6-morpholin-4-yl)-1H-benzimidazol-2-yl)-1H-indazole	350.4
405	3-(6-morpholin-4-yl)-1H-benzimidazol-2-yl)-5-nitro-1H-	365.4

WO 03/004488

PCT/US02/20844

-273-

	indazole	
406	methyl 3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	378.4
407	5-methyl-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	334.4
408	5-(benzyloxy)-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	426.5
409	6-fluoro-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	338.4
410	6-chloro-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	354.8
411	6-methoxy-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	350.4
412	5-ethoxy-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	364.4
413	3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-6-nitro-1H-indazole	365.4
414	3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-[1,3]dioxolo[4,5-f]indazole	364.4
415	7-methyl-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	334.4
416	7-chloro-3-(6-morpholin-4-yl-1H-benzimidazol-2-yl)-1H-indazole	354.8
417	N-({(2R,5S)-4-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-5-yl]-5-methylmorpholin-2-yl)methyl}-N,N-dimethylamine	425.9
418	N-(3,4-dimethoxybenzyl)-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	498.6
419	N-[4-(benzyloxy)-3-methoxybenzyl]-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	574.7
420	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-(4-phenoxybenzyl)-1H-indazol-5-amine	530.6
421	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-fluoro-1H-indazole	379.4
422	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-chloro-1H-indazole	395.9
423	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-bromo-1H-indazole	440.3
424	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	406.4
425	methyl 3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	419.5
426	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methyl-1H-indazole	375.4

WO 03/004488

PCT/US02/20844

-274-

427	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-(benzyloxy)-1H-indazole	467.5
428	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-chloro-1H-indazole	395.9
429	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-methoxy-1H-indazole	391.4
430	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-ethoxy-1H-indazole	405.5
431	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-nitro-1H-indazole	406.4
432	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	405.4
433	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-7-methyl-1H-indazole	375.4
434	3-[6-(4-acetylpiperazin-1-yl)-1H-benzimidazol-2-yl]-7-chloro-1H-indazole	395.9
435	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(2-chloropyridin-3-yl)methyl]-1H-indazol-5-amine	542.1
436	2-(5-fluoro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	373.4
437	2-(5-chloro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	389.9
438	2-(5-methoxy-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	385.4
439	2-(5-nitro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	400.4
440	methyl 3-{6-[(2-pyridin-4-ylethyl)amino]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	413.5
441	2-(6-fluoro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	373.4
442	2-(6-chloro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	389.9
443	2-(6-methoxy-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	385.4
444	2-(5-ethoxy-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	399.5
445	2-(6-nitro-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	400.4
446	2-(5-methyl-1H-indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	369.4
447	2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-N-(2-pyridin-4-ylethyl)-1H-benzimidazol-6-amine	399.4
448	2-(5-methyl-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	389.9
449	2-(1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-	377.5

WO 03/004488

PCT/US02/20844

-275-

	benzimidazol-6-amine	
450	2-(5-fluoro-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	395.5
451	2-(5-chloro-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	411.9
452	2-(5-bromo-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	456.4
453	2-(5-methoxy-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	407.5
454	N-(3-morpholin-4-ylpropyl)-2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	422.5
455	methyl 3-{6-[(3-morpholin-4-ylpropyl)amino]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	435.5
456	2-(5-methyl-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	391.5
457	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	483.6
458	2-(6-fluoro-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	395.5
459	2-(6-chloro-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	411.9
460	2-(6-methoxy-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	407.5
461	2-(5-ethoxy-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	421.5
462	N-(3-morpholin-4-ylpropyl)-2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-amine	422.5
463	2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	421.5
464	2-(7-chloro-1H-indazol-3-yl)-N-(3-morpholin-4-ylpropyl)-1H-benzimidazol-6-amine	411.9
465	N-(3-morpholin-4-ylpropyl)-2-[6-(trifluoromethyl)-1H-indazol-3-yl]-1H-benzimidazol-6-amine	445.5
466	3,5-bis(1H-benzimidazol-2-yl)-1H-indazole	351.4
467	{1-[2-(1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	348.4
468	{1-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	366.4
469	{1-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	382.9
470	{1-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	427.3
471	{1-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	378.4
472	{1-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	393.4

WO 03/004488

PCT/US02/20844

-276-

	yl]piperidin-4-yl}methanol	
473	methyl 3-{6-[4-(hydroxymethyl)piperidin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	406.5
474	{1-[2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	362.4
475	(1-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}piperidin-4-yl)methanol	454.5
476	{1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	366.4
477	{1-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	382.9
478	{1-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	378.4
479	{1-[2-(5-ethoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	392.5
480	{1-[2-(6-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	393.4
481	{1-[2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	392.4
482	{1-[2-(7-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]piperidin-4-yl}methanol	382.9
483	(1-{2-[6-(trifluoromethyl)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}piperidin-4-yl)methanol	416.4
484	3-(1H-benzimidazol-2-yl)-5-(benzyloxy)-1H-indazole	341.4
485	5-(1H-benzimidazol-2-yl)-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	449.5
486	N-({1-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]pyrrolidin-3-yl}methyl)-N,N-dimethylamine	379.5
487	3-(1H-benzimidazol-2-yl)-1H-[1,3]dioxolo[4,5-f]indazole	279.3
488	3-(1H-benzimidazol-2-yl)-6-chloro-1H-indazole	269.7
489	3-(1H-benzimidazol-2-yl)-6-fluoro-1H-indazole	253.3
490	3-(1H-benzimidazol-2-yl)-1H-indazole-6-carbonitrile	260.3
491	3-(1H-benzimidazol-2-yl)-6-nitro-1H-indazole	280.3
492	3-(1H-benzimidazol-2-yl)-N-(2-morpholin-4-ylethyl)-1H-indazole-6-carboxamide	391.4
493	6-fluoro-3-{6-[(8aS)-hexahydropyrrolo[1,2-a]pyrazin-2(1H)-yl]-1H-benzimidazol-2-yl}-1H-indazole	377.4
494	5-chloro-3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	381.9
495	5-bromo-3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	426.3
496	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-5-methoxy-1H-indazole	377.5
497	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-5-nitro-1H-indazole	392.4

WO 03/004488

PCT/US02/20844

-277-

498	methyl 3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole-5-carboxylate	405.5
499	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-5-methyl-1H-indazole	361.5
500	5-(benzyloxy)-3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	453.6
501	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-6-fluoro-1H-indazole	365.4
502	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-6-nitro-1H-indazole	381.9
503	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-6-methoxy-1H-indazole	377.5
504	5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-2-(1H-pyrazol-3-yl)-1H-benzimidazole	297.4
505	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-5-ethoxy-1H-indazole	391.5
506	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-6-nitro-1H-indazole	392.4
507	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-[1,3]dioxolo[4,5-f]indazole	391.4
508	7-chloro-3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole	381.9
509	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-5-methoxy-4-methyl-1H-indazole	391.5
510	3-{5-[(3R,5S)-3,5-dimethylpiperazin-1-yl]-1H-benzimidazol-2-yl}-1H-indazole-6-carbonitrile	372.4
511	5-fluoro-3-(5-methyl-1H-benzimidazol-2-yl)-1H-indazole	267.3
512	5-methoxy-3-(5-methyl-1H-benzimidazol-2-yl)-1H-indazole	279.3
513	methyl 3-(5-methyl-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	307.3
514	3-(5-methyl-1H-benzimidazol-2-yl)-1H-indazole-5-carbonitrile	274.3
515	3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	347.4
516	5-fluoro-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	365.4
517	5-chloro-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.9
518	5-bromo-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	426.3
519	5-methoxy-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	377.5
520	3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	392.4

WO 03/004488

PCT/US02/20844

-278-

521	methyl 3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	405.5
522	5-methyl-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	361.5
523	5-(benzyloxy)-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	453.6
524	6-fluoro-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	365.4
525	6-chloro-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.9
526	6-methoxy-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	377.5
527	5-ethoxy-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	391.5
528	3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-6-nitro-1H-indazole	392.4
529	3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	391.4
530	7-chloro-3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.9
531	3-[6-(4-methyl-1,4-diazepan-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	372.4
532	5-(benzyloxy)-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	439.5
533	5-isopropoxy-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	391.5
534	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-[(5-nitropyridin-2-yl)oxy]-1H-indazole	471.5
535	5-methyl-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	347.4
536	5-ethoxy-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	377.5
537	5-isobutoxy-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	405.5
538	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-nitro-1H-indazole	378.4
539	N-isopropyl-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	390.5
540	5-bromo-3-(5-methyl-1H-benzimidazol-2-yl)-1H-indazole	328.2
541	3-(1H-benzimidazol-2-yl)-5-nitro-1H-indazole	280.3
542	methyl 3-(1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	293.3
543	6-chloro-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	367.9
544	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-	378.4

WO 03/004488

PCT/US02/20844

-279-

	nitro-1H-indazole	
545	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	358.4
546	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carboxylic acid	377.4
547	3-(1H-benzimidazol-2-yl)-6-methyl-1H-indazole	249.3
548	5-methyl-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	347.4
549	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	377.4
550	3-(1H-benzimidazol-2-yl)-1H-indazole-6-amine	250.3
551	3-(1H-benzimidazol-2-yl)-1H-indazole-6-carboxylic acid	279.3
552	3-(1H-benzimidazol-2-yl)-6-methoxy-1H-indazole	265.3
553	3-(1H-benzimidazol-2-yl)-1H-indazole-5-carboxylic acid	279.3
554	3-(1H-benzimidazol-2-yl)-5-chloro-1H-indazole	269.7
555	3-(5-chloro-1H-benzimidazol-2-yl)-5-fluoro-1H-indazole	287.7
556	3-(5-chloro-1H-benzimidazol-2-yl)-5-methoxy-1H-indazole	299.7
557	3-(1H-benzimidazol-2-yl)-5-bromo-1H-indazole	314.2
558	3-(1H-benzimidazol-2-yl)-5-fluoro-1H-indazole	253.3
559	3-(1H-benzimidazol-2-yl)-1H-indazole-5-carbonitrile	260.3
560	6-bromo-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	412.3
561	5-bromo-3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	412.3
562	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	347.4
563	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-fluoro-1H-indazole	365.4
564	5-chloro-3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.9
565	5-bromo-3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	426.3
566	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methoxy-1H-indazole	377.5
567	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	392.4
568	methyl 3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	405.5
569	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methyl-1H-indazole	361.5
570	5-(benzyloxy)-3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	453.6
571	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-	365.4

WO 03/004488

PCT/US02/20844

-280-

	fluoro-1H-indazole	
572	6-chloro-3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.9
573	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-methoxy-1H-indazole	377.5
574	5-ethoxy-3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	391.5
575	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-nitro-1H-indazole	392.4
576	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	391.4
577	7-chloro-3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	381.9
578	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methoxy-4-methyl-1H-indazole	391.5
579	3-[6-(4-ethylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	372.4
580	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-fluoro-1H-indazole	419.5
581	5-chloro-3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	436.0
582	5-bromo-3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	480.4
583	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methoxy-1H-indazole	431.6
584	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	446.5
585	methyl 3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	459.6
586	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methyl-1H-indazole	415.6
587	5-(benzyloxy)-3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	507.7
588	6-chloro-3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	436.0
589	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-methoxy-1H-indazole	431.6
590	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-ethoxy-1H-indazole	445.6
591	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-6-nitro-1H-indazole	446.5
592	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	445.5
593	7-chloro-3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	436.0

WO 03/004488

PCT/US02/20844

-281-

594	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methoxy-4-methyl-1H-indazole	445.6
595	3-[6-(4-cyclohexylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	426.5
596	3-(5-chloro-1H-benzimidazol-2-yl)-5-nitro-1H-indazole	314.7
597	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylic acid	377.4
598	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-4-nitro-1H-indazole	378.4
599	3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	396.5
600	5-fluoro-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	414.5
601	5-chloro-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	430.9
602	5-bromo-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	475.4
603	5-methoxy-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	426.5
604	5-nitro-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	441.5
605	methyl 3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	454.5
606	5-methyl-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	410.5
607	5-(benzyloxy)-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	502.6
608	6-fluoro-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	414.5
609	6-chloro-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	430.9
610	5-ethoxy-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	440.5
611	3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	440.5
612	7-chloro-3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	430.9
613	3-[6-(4-pyridin-2-ylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	421.5
614	3-[5-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-[(2S)-pyrrolidin-2-ylmethyl]-1H-indazol-4-amine	431.6
615	3-(6-chloro-1H-benzimidazol-2-yl)-1H-indazole-5-carbonitrile	294.7
616	methyl 3-(6-chloro-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	327.7

WO 03/004488

PCT/US02/20844

-282-

617	N'-[3-(1H-benzimidazol-2-yl)-1H-indazol-5-yl]-N,N-dimethylpropane-1,3-diamine	335.4
618	5-chloro-3-(6-chloro-1H-benzimidazol-2-yl)-1H-indazole	304.2
619	5-bromo-3-(5-chloro-1H-benzimidazol-2-yl)-1H-indazole	348.6
620	N-({4-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]morpholin-2-yl}methyl)-N,N-dimethylamine	411.9
621	N-({4-[2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl]morpholin-2-yl}methyl)-N,N-dimethylamine	456.4
622	N,N-dimethyl-N-({4-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]morpholin-2-yl}methyl)amine	422.5
623	methyl 3-(6-{2-[(dimethylamino)methyl]morpholin-4-yl}-1H-benzimidazol-2-yl)-1H-indazole-5-carboxylate	435.5
624	N-[(4-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}morpholin-2-yl)methyl]-N,N-dimethylamine	483.6
625	N-({4-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]morpholin-2-yl}methyl)-N,N-dimethylamine	395.5
626	N-({4-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]morpholin-2-yl}methyl)-N,N-dimethylamine	411.9
627	3-(6-{2-[(dimethylamino)methyl]morpholin-4-yl}-1H-benzimidazol-2-yl)-1H-indazole-6-carbonitrile	402.5
628	2-(5-chloro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	375.8
629	2-(5-bromo-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	MW!
630	2-(5-nitro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	386.4
631	2-(5-methyl-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	355.4
632	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	447.5
633	2-(6-fluoro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	359.4
634	2-(7-chloro-1H-indazol-3-yl)-N-(pyridin-4-ylmethyl)-1H-benzimidazol-6-amine	375.8
635	3-{6-[(pyridin-4-ylmethyl)amino]-1H-benzimidazol-2-yl}-1H-indazole-6-carbonitrile	366.4
636	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-4-amine	348.4
637	N-({(2S,5S)-4-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-5-methylmorpholin-2-yl}methyl)-N,N-dimethylamine	409.5
638	N-({(2S,5S)-4-[2-(6-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-5-methylmorpholin-2-yl}methyl)-N,N-dimethylamine	425.9

WO 03/004488

PCT/US02/20844

-283-

639	3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	301.3
640	5-fluoro-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	319.3
641	5-chloro-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	335.8
642	5-bromo-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	380.2
643	3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-5-methoxy-1H-indazole	331.4
644	3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-5-nitro-1H-indazole	346.3
645	methyl 3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	359.4
646	3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-5-methyl-1H-indazole	315.4
647	5-(benzyloxy)-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	407.4
648	6-fluoro-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	319.3
649	6-chloro-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	335.8
650	5-ethoxy-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	345.4
651	3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	345.3
652	7-chloro-3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	335.8
653	3-[6-(1H-imidazol-1-yl)-1H-benzimidazol-2-yl]-1H-indazole-6-carbonitrile	326.3
654	2-(5-fluoro-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	379.5
655	2-(5-chloro-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	395.9
656	2-(5-methoxy-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	391.5
657	2-(5-nitro-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	406.5
658	2-(5-methyl-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	375.5
659	2-[5-(benzyloxy)-1H-indazol-3-yl]-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	467.6
660	2-(6-fluoro-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	379.5
661	2-(6-chloro-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	395.9

WO 03/004488

PCT/US02/20844

-284-

	1H-benzimidazol-6-amine	
662	2-(5-ethoxy-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	405.5
663	2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	405.5
664	2-(7-chloro-1H-indazol-3-yl)-N-(3-pyrrolidin-1-ylpropyl)-1H-benzimidazol-6-amine	395.9
665	N,N-diethyl-N'-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N'-methylpropane-1,3-diamine	395.5
666	N-[2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N',N'-diethyl-N-methylpropane-1,3-diamine	412.0
667	N,N-diethyl-N'-methyl-N'-[2-(5-nitro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]propane-1,3-diamine	422.5
668	N-{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}-N',N'-diethyl-N-methylpropane-1,3-diamine	483.6
669	N,N-diethyl-N'-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N'-methylpropane-1,3-diamine	395.5
670	N-[2-(7-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl]-N',N'-diethyl-N-methylpropane-1,3-diamine	412.0

EXAMPLE 671**3-[6-(1,4'-Bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine**

To a solution of the product produced in Example 110 (1.0 eq) in
5 ethanol:ethyl acetate (1:1) was added 10% Pd/C (0.5 eq). The reaction vessel was repeatedly purged with nitrogen and then stirred under a hydrogen atmosphere (1 atm) for 48 hours. The product was filtered through Celite with ethanol. The solvent was removed to provide a brown solid which was used without purification. LC/MS (m/z) 416.1 (MH⁺), R_t 1.30 minutes.

10

EXAMPLES 672-684

Examples 672-684 were synthesized from amino substituted indazole benzimidazoles and isocyanates, using the procedure set forth below for the synthesis of various compounds which include a urea substituent.

WO 03/004488

PCT/US02/20844

-285-

EXAMPLE 672

N-{3-[6-(1,4'-Bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-N'-phenylurea

- 5 Benzimidazol-2-yl-1H-indazole-5-ylamine was dissolved in THF and and phenylisocyanate (1.1 equivalents) was added. The mixture was shaken overnight, the solution was concentrated, and the resulting residue was purified by preparatory HPLC. LC/MS (m/z) 535.6 (MH⁺), R_t 1.93 minutes.

Example	Name	LC/MS (m/z) (MH ⁺)
673	1'-[2-(6-chloro-1H-indazol-3-yl)-3H-imidazo[4,5-b]pyridin-5-yl]-1,4'-bipiperidine	437.0
674	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-N'-isopropylurea	501.6
675	N-benzyl-N'-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}urea	549.7
676	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-N'-(2,4-dimethoxyphenyl)urea	595.7
677	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-N'-(tert-butyl)urea	515.7
678	N-[3-(1H-benzimidazol-2-yl)-1H-indazol-5-yl]-N'-(tert-butyl)urea	349.4
679	N-(tert-butyl)-N'-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}urea	447.6
680	N-isopropyl-N'-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}urea	433.5
681	N-(tert-butyl)-N'-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}urea	447.6
682	N-ethyl-N'-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}urea	419.5
683	N-(2-methoxyphenyl)-N'-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}urea	497.6
684	N-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}-N'-[3-(trifluoromethyl)phenyl]urea	535.5

WO 03/004488

PCT/US02/20844

-286-

EXAMPLES 685-689

Examples 685-689 were synthesized from amino substituted indazole-benzimidazoles and acyl halides or sulfonyl halides, using the coupling procedures set forth below for the synthesis of various compounds that include the

5 -N(H)-C(=O)-R or the -N(H)-(SO₂)-R' group.

EXAMPLE 685

N-{3-[6-(1,4'-Bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}benzamide

10 Benzimidazol-2-yl-1H-indazole-5-ylamine was dissolved in CH₂Cl₂ and benzoyl chloride (1.1 equivalent) was added followed by diisopropylethylamine (1.1 equivalent). The resulting mixture was allowed to stir overnight. The solution was then concentrated and the resulting residue was purified by preparatory HPLC. LC/MS (m/z) 520.6 (MH⁺), R_t 1.86 minutes

EXAMPLE 688

15 **N-{3-[6-(1,4'-Bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}methanesulfonamide**

3-Benzimidazol-2-yl-1H-indazole-5-ylamine (1 equivalent), methanesulfonyl chloride (1.1 equivalent), and diisopropylethylamine (2 equivalents) in CH₂Cl₂ were stirred for 18 hours. The solvent was evaporated, and the resulting
20 residue was purified by preparatory HPLC. . LC/MS (m/z) 494.6 (MH⁺), R_t 2.35 minutes.

WO 03/004488

PCT/US02/20844

-287-

Example	Name	LC/MS (m/z) (MH ⁺)
686	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}acetamide	458.6
687	N-{3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-yl}-2-furamide	510.6
689	N-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}ethanesulfonamide	440.2

EXAMPLES 690-726

Examples 690-726 were synthesized from amino substituted indazole-benzimidazoles and carbonyl compounds, using the procedure set forth below for

5 **Example 710.****EXAMPLE 710****3-(1H-Benzimidazol-2-yl)-N-(1,3-thiazol-2-ylmethyl)-1H-indazol-5-amine**

10 3-Benzimidazol-2-yl-1H-indazole-5-ylamine (1 equivalent), 2-thiazolecarboxaldehyde(1.1 equivalent), BH₃:pyridine (10 equivalents, 8 M in pyridine) in AcOH:MeOH:CH₂Cl₂ (1:2:2) were stirred for 18 hours at room temperature. The solvent was removed, and the residue was purified by preparatory HPLC. LC/MS (m/z) 347.1 (MH⁺), R_t 1.93 minutes.

Example	Name	LC/MS (m/z) (MH ⁺)
690	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(3-methyl-1H-pyrazol-4-yl)methyl]-1H-indazol-5-amine	509.7
691	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(2-furylmethyl)-1H-indazol-5-amine	495.6
692	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(2,3-dihydro-1-benzofuran-5-ylmethyl)-1H-indazol-5-amine	547.7
693	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(1H-imidazol-2-ylmethyl)-1H-indazol-5-amine	495.6
694	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(1,3-thiazol-2-ylmethyl)-1H-indazol-5-amine	512.7

WO 03/004488

PCT/US02/20844

-288-

695	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(3-methoxybenzyl)-1H-indazol-5-amine	535.7
696	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(2S)-pyrrolidin-2-ylmethyl]-1H-indazol-5-amine	498.7
697	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-({5-[(dimethylamino)methyl]-2-furyl}methyl)-1H-indazol-5-amine	552.7
698	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(3,5-dimethylisoxazol-4-yl)methyl]-1H-indazol-5-amine	524.7
699	N-(1H-1,2,3-benzotriazol-5-ylmethyl)-3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	546.7
700	N-(1H-benzimidazol-5-ylmethyl)-3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	545.7
701	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(5-chloro-1,3-dimethyl-1H-pyrazol-4-yl)methyl]-1H-indazol-5-amine	558.1
702	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(4-chloro-1-methyl-1H-pyrazol-3-yl)methyl]-1H-indazol-5-amine	544.1
703	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-[(2-ethyl-4-methyl-1H-imidazol-5-yl)methyl]-1H-indazol-5-amine	537.7
704	N-(1-(N-hydroxycarbamoyl)(1S,2R)-2-hydroxypropyl){4-[4-(N-ethylcarbamoyl)phenyl]phenyl}carboxamide	385.4
705	N-{4-[(4-fluorobenzyl)oxy]benzyl}-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	561.7
706	N-(1H-benzimidazol-2-ylmethyl)-3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	545.7
707	N-benzyl-3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	505.7
708	3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-N-(cyclohexylmethyl)-1H-indazol-5-amine	511.7
709	N-(1-benzylpiperidin-4-yl)-3-[6-(1,4'-bipiperidin-1'-yl)-1H-benzimidazol-2-yl]-1H-indazol-5-amine	588.8
711	3-(1H-benzimidazol-2-yl)-N-[(2S)-pyrrolidin-2-ylmethyl]-1H-indazol-5-amine	332.4

WO 03/004488

PCT/US02/20844

-289-

712	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-(1,3-thiazol-2-ylmethyl)-1H-indazol-5-amine	444.6
713	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-[(2S)-pyrrolidin-2-ylmethyl]-1H-indazol-5-amine	430.6
714	N-(2,5-dimethoxybenzyl)-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	497.6
715	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-(1,3-thiazol-2-ylmethyl)-1H-indazol-6-amine	444.6
716	N-[(1-methyl-1H-benzimidazol-2-yl)methyl]-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	491.6
717	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-[(2-phenyl-1H-imidazol-4-yl)methyl]-1H-indazol-6-amine	503.6
718	N-benzyl-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	437.5
719	N-[(2-ethyl-4-methyl-1H-imidazol-5-yl)methyl]-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	469.6
720	N-(2-furylmethyl)-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	427.5
721	N-[(4-methoxyquinolin-2-yl)methyl]-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	518.6
722	3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-N-(1-methylpiperidin-4-yl)-1H-indazol-6-amine	444.6
723	N-(2-fluoro-5-methoxybenzyl)-3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-amine	485.6
724	N-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}-2-furamide	441.5
725	N-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}-1,3-oxazole-5-carboxamide	442.5
726	N-{3-[6-(4-methylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazol-6-yl}acetamide	389.5

WO 03/004488

PCT/US02/20844

-290-

EXAMPLE 727

Synthesis of [(1Z)-2-aza-1-(4-methylpiperazinyl)-2-phenylvinyl]{3-[6-(4-piperidylpiperidyl)benzimidazol-2-yl](1H-indazol-5-yl)}amine

3-[6-(4-piperidylpiperidyl)benzimidazol-2-yl]-1H-indazole-5-ylamine
5 was dissolved in THF and shaken with benzenisothiocyanate (1.1 equivalents) for 18 hours. EDC-HCl (1.1 equivalents) and N-methylpiperazine (3 equivalents) were then added. The resulting solution was shaken for 18 hours. The solvent was then evaporated, and the residue was purified by preparatory HPLC to give [(1Z)-2-aza-1-(4-methyl-piperazinyl)-2-phenylvinyl]{3-[6-(4-piperidylpiperidyl)benzimidazol-2-yl](1H-indazol-5-yl)}amine. LC/MS (m/z) 617.5 (MH⁺), R_t 2.65 minutes.
10

EXAMPLE 728

N'-[3-(1H-Benzoimidazol-2-yl)-1H-indazol-5-yl]-N,N-dimethyl-propane-1,3-diamine

Synthesis of 5-Bromo-1-(2-trimethylsilanyl-ethoxymethyl)-3-[1-(2-trimethylsilanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazole
15

A reaction mixture of 3-benzimidazol-2-yl-5-bromo-1H-indazole in CH₂Cl₂ and aqueous 50% NaOH solution was cooled to 0°C and charged with SEMCl (2.2 equivalents). The reaction was stirred overnight and the cooling bath was gradually allowed to warm to room temperature. The reaction was partitioned
20 between water and methylene chloride and the layers separated. The aqueous phase was extracted with CH₂Cl₂ (3X) and the organic extracts were combined and washed with brine. The resulting crude residue was purified by flash chromatography to give 5-bromo-1-(2-trimethylsilanyl-ethoxymethyl)-3-[1-(2-trimethylsilanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazole. LC/MS (m/z) 573.1 (MH⁺),
25 R_t 4.29 minutes.

WO 03/004488

PCT/US02/20844

-291-

Synthesis of N,N-Dimethyl-N'-{1-(2-trimethylsilylanyl-ethoxymethyl)-3-[1-(2-trimethylsilylanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-propane-1,3-diamine

To a solution of 5-bromo-1-(2-trimethylsilylanyl-ethoxymethyl)-3-[1-(2-trimethylsilylanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazole in dry toluene
5 trimethylsilylanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazole in dry toluene was added Pd₂(dba)₃ (0.02 equivalents), (R)-BINAP (0.06 equivalents), N,N dimethyl propyldiamine (1.6 equivalents), and sodium t-butoxide (1.2 equivalents). The resulting reaction mixture was subjected to microwave irradiation (≈ 300 watts, 120°C, 10 minutes). The crude reaction product was purified by chromatography to
10 furnish N,N-Dimethyl-N'-{1-(2-trimethylsilylanyl-ethoxymethyl)-3-[1-(2-trimethylsilylanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-propane-1,3-diamine. LC/MS (m/z) 595.3 (MH⁺), R_t 2.95 minutes.

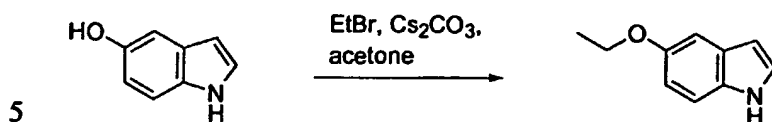
Synthesis of N'-[3-(1H-Benzoimidazol-2-yl)-1H-indazol-5-yl]-N,N-dimethyl-propane-1,3-diamine

15 A solution of N,N-dimethyl-N'-{1-(2-trimethylsilylanyl-ethoxymethyl)-3-[1-(2-trimethylsilylanyl-ethoxymethyl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-propane-1,3-diamine in THF was treated with ethylene diamine (20 equivalents) and tetrabutylammonium fluoride (20 equivalents) and heated at 70°C overnight. The resulting crude residue was purified by reverse phase HPLC to N'-[3-(1H-
20 Benzoimidazol-2-yl)-1H-indazol-5-yl]-N,N-dimethyl-propane-1,3-diamine. LC/MS (m/z) 335.1 (MH⁺), R_t 1.30 minutes.

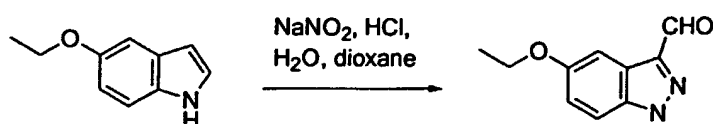
WO 03/004488

PCT/US02/20844

-292-

EXAMPLE 729**2-{4-[2-(5-Ethoxy-1H-indazol-3-yl)-3H-benzimidazol-5-yl]-piperazin-1-yl}-ethanol****Synthesis of 5-Ethoxyindole**

5-Hydroxyindole (1.0 equivalents) was dissolved in dry, degassed acetone. EtBr (5.0 equivalents) and Cs₂CO₃ (2.5 equivalents) were added, and the resulting solution was stirred for 18 hours. The reaction mixture was filtered through a Celite plug. The solvent was evaporated and the product purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the desired indole ether title compound. LC/MS (m/z) 162.1 (MH⁺), R_t 2.45 minutes.

Synthesis of 5-Ethoxy-1H-indazole-3-carbaldehyde

The formation of 5-ethoxy-1H-indazole-3-carbaldehyde from 5-ethoxyindole was carried out using the procedures described above in Example 4. LC/MS (m/z) 191.1 (MH⁺), R_t 2.14 minutes.

Synthesis of 2-{4-[2-(5-Ethoxy-1H-indazol-3-yl)-3H-benzimidazol-5-yl]-piperazin-1-yl}-ethanol

The formation of 2-{4-[2-(5-ethoxy-1H-indazol-3-yl)-3H-benzimidazol-5-yl]-piperazin-1-yl}-ethanol was carried out using 5-ethoxy-1H-indazole-3-carbaldehyde and 2-[4-(3,4-diaminophenyl)-piperazin-1-yl]-ethanol using

WO 03/004488

PCT/US02/20844

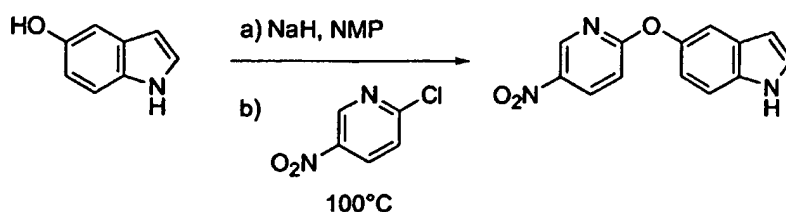
-293-

the method described above in Example 4. LC/MS (m/z) 407.3, (MH⁺), R_t 2.65 minutes.

EXAMPLE 730

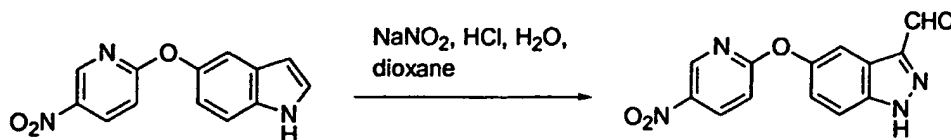
3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-(5-nitro-pyridin-2-yloxy)-1H-indazole

Synthesis of 5-(5-Nitro-pyridin-2-yloxy)-1H-indole



NaH (1.1 equivalents) was added to a solution of 5-hydroxyindole (1.0 equivalent) in NMP. The resulting mixture stirred for 2 hours at room temperature. 2-Chloro-5-nitropyridine (1.1 equivalents) was added and the solution was heated to 100°C for 2 hours. The solution was cooled and poured into water. The aqueous layer was extracted with EtOAc three times. The organic layers were then combined and concentrated to yield the desired indole heteroaryl ether 5-(5-nitro-pyridin-2-yloxy)-1H-indole.

15 Synthesis of 5-(5-Nitro-pyridin-2-yloxy)-1H-indazole-3-carbaldehyde



The formation of 5-(5-nitro-pyridin-2-yloxy)-1H-indazole-3-carbaldehyde from 5-(5-nitro-pyridin-2-yloxy)-1H-indole was carried using the method described above in Example 4. LC/MS (m/z) 285.2 (MH⁺), R_t 2.43 minutes.

WO 03/004488

PCT/US02/20844

-294-

Synthesis of 3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-(5-nitro-pyridin-2-yloxy)-1H-indazole-

The title compound was synthesized from 5-(5-nitro-pyridin-2-yloxy)-1H-indazole-3-carbaldehyde and 4-(4-methyl-piperazin-1-yl)-benzene-1,2-diamine using the method described above in Example 4. LC/MS (m/z) 471.3 (MH⁺), R_t 2.94 minutes.

EXAMPLE 731

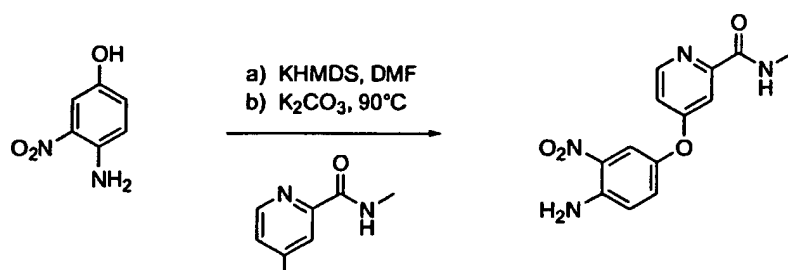
3-(1H-Benzoimidazol-2-yl)-1H-indazol-5-ol

A solution of 5-hydroxyindole (1.0 equivalent), benzyl chloroformate (1.1 equivalents), and diisopropylethylamine (2.0 equivalents) in CH₂Cl₂ was stirred for 18 hours. The solution is concentrated to yield the desired CBz protected indole ether. The product is then reacted with NaNO₂ in HCl and dioxane as previously described, followed by reaction with phenylenediamine in EtOH and toluene using the methods described above to yield the Cbz protected indazole benzimidazole. The Cbz-protected product is deprotected using 10% Pd/C and H₂ to provide the desired 5-hydroxyindole benzimidazole.

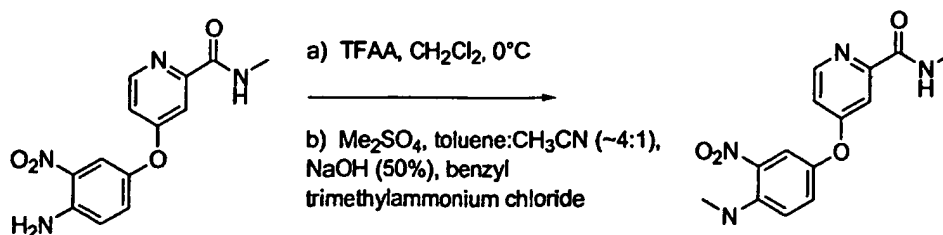
WO 03/004488

PCT/US02/20844

-295-

EXAMPLE 732**4-[2-(5-Fluoro-1H-indazol-3-yl)-1-methyl-1H-benzoimidazol-5-yloxy]-pyridine-2-carboxylic acid methylamide****Synthesis of 4-(4-Amino-3-nitro-phenoxy)-pyridine-2-carboxylic acid****5 methylamide**

A mixture containing 4-amino-3-nitrophenol (1 equivalent) and potassium bis(trimethylsilyl)amide (2 equivalents) was stirred in dimethylformamide for 2 hours at room temperature. [4-chloro-(2-pyridyl)]-N-methylcarboxamide (1 equivalent) and potassium carbonate (1.5 equivalents) were added to the mixture, and the reaction was stirred at 90°C for 3 days. The reaction mixture was then concentrated and partitioned between ethyl acetate and water. The organic layer was separated, washed with brine (2x), dried, filtered, and concentrated to give brown solid. LC/MS (m/z) 289.2 (MH⁺), R_t 2.18 minutes.

15 Synthesis of 4-(4-Methylamino-3-nitro-phenoxy)-pyridine-2-carboxylic acid methylamide

WO 03/004488

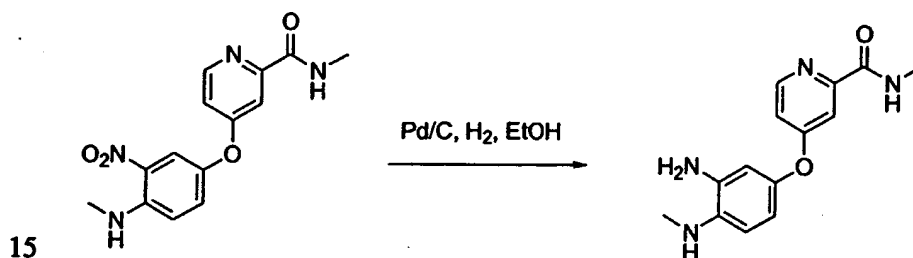
PCT/US02/20844

-296-

A solution of 4-(4-amino-3-nitro-phenoxy)-pyridine-2-carboxylic acid methylamide (1 equivalent) in CH_2Cl_2 was treated with trifluoroacetic anhydride (1 equivalent) and stirred for 10 minutes at 0°C . The mixture was quenched with a saturated NaHCO_3 solution. The organic layer was separated and washed with
5 water and brine, dried, and evaporated to yield the trifluoroacetamide.

To the solution of the trifluoroacetamide (1 equivalent) in a mixture of toluene:acetonitrile (approximately 4:1) and sodium hydroxide solution (50%) was added benzyltrimethylammonium chloride (1 equivalent) and dimethyl sulfate (1.5 equivalents). The biphasic mixture was stirred overnight at room temperature.
10 The mixture was evaporated and then taken up in ethyl acetate, washed with water (2x) and brine (2x), dried, and evaporated to yield the title compound as a reddish orange solid. LC/MS (m/z) 303.3 (MH^+), R_t 2.42 minutes.

Synthesis of 4-(3-Amino-4-methylamino-phenoxy)-pyridine-2-carboxylic acid methylamide



4-(4-Methylamino-3-nitro-phenoxy)-pyridine-2-carboxylic acid methylamide was reduced using the hydrogenation procedure described in Method 1. LC/MS (m/z) 273.3 (MH^+), R_t 1.63 minutes.

Synthesis of 4-[2-(5-Fluoro-1H-indazol-3-yl)-1-methyl-1H-benzoimidazol-5-yl]pyridine-2-carboxylic acid methylamide

The title compound was synthesized from 5-fluoro-1H-indazole-3-carbaldehyde and 4-(3-amino-4-methylamino-phenoxy)-pyridine-2-carboxylic acid

WO 03/004488

PCT/US02/20844

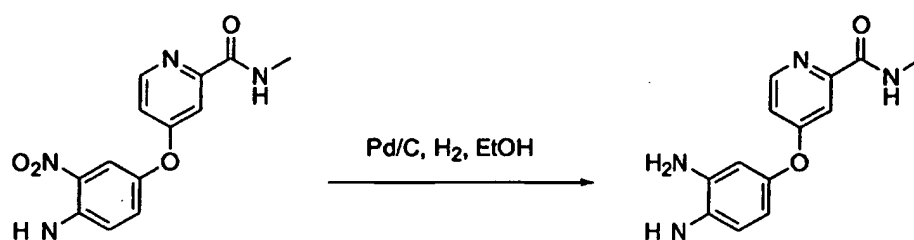
-297-

methylamide as described above in Example 4. LC/MS (m/z) 417.4 (MH⁺), R_t 3.62 minutes.

EXAMPLE 733

4-[2-(5-Fluoro-1H-indazol-3-yl)-1H-benzoimidazol-5-yloxy]-pyridine-2-
5 carboxylic acid methylamide

Synthesis of 4-(3,4-Diamino-phenoxy)-pyridine-2-carboxylic acid methylamide



4-(4-Amino-3-nitro-phenoxy)-pyridine-2-carboxylic acid methylamide
 was reduced using the hydrogenation procedure described in Method 1. LC/MS
 10 (m/z) 259.2 (MH⁺), R_t 1.32 minutes.

Synthesis of 4-[2-(5-Fluoro-1H-indazol-3-yl)-1H-benzoimidazol-5-yloxy]-
pyridine-2-carboxylic acid methylamide

The title compound was synthesized from 5-fluoro-1H-indazole-3-
 carbaldehyde and 4-(3,4-diamino-phenoxy)-pyridine-2-carboxylic acid methylamide
 15 using the method described above in Example 4. LC/MS (m/z) 403.1 (MH⁺), R_t
 2.26 minutes.

EXAMPLES 734-741

The compounds in the following table are synthesized using the
 procedures described above.

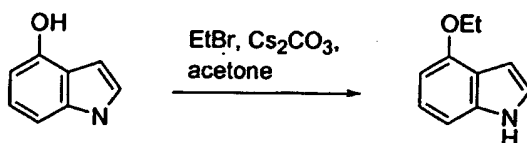
Example	Name
734	{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine

WO 03/004488

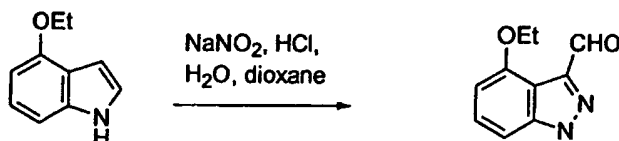
PCT/US02/20844

-298-

735	{4-[2-(5-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
736	{4-[2-(5-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
737	dimethyl-(5-methyl-4-{2-[5-(1-methyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
738	1'-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]
739	1'-[2-(5-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]
740	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-(1-methyl-piperidin-3-yloxy)-1H-indazole
741	1'-{2-[5-(1-methyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny]

EXAMPLE 742**1'-[2-(4-Ethoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]****Synthesis of 4-Ethoxy-1H-indole**

- 5 4-Hydroxyindole (1.0 equivalents) is dissolved in dry, degassed acetone. EtBr (5.0 equivalents) and Cs₂CO₃ (2.5 equivalents) are added, and the resulting solution is stirred for 18 hours. The reaction mixture is filtered through a Celite plug. The solvent is evaporated, and the product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the title compound.

10 Synthesis of 4-Ethoxy-1H-indazole-3-carbaldehyde

WO 03/004488

PCT/US02/20844

-299-

The formation of the title compound from 4-ethoxy-1H-indole is carried out using the procedure described above in Example 4.

Synthesis of 1'-[2-(4-Ethoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI

- 5 The formation of the title compound is carried out using 4-ethoxy-1H-indazole-3-carbaldehyde and 4-[1,4']bipiperidinyI-1'-yl-benzene-1,2-diamine using the method described above in Example 4.

EXAMPLES 743-754

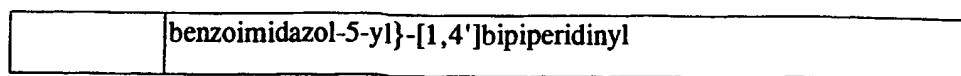
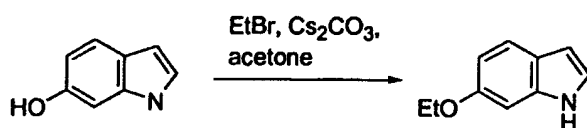
- 10 The compounds in the following table are synthesized using the procedures described above.

Example	Name
743	{4-[2-(4-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
744	{4-[2-(4-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
745	{4-[2-(4-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
746	(4-{2-[4-(1-ethyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
747	4-methoxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
748	4-isopropoxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
749	4-benzyloxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
750	4-(1-ethyl-piperidin-3-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
751	1'-[2-(4-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
752	1'-[2-(4-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
753	1'-[2-(4-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
754	1'-{2-[4-(1-ethyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-

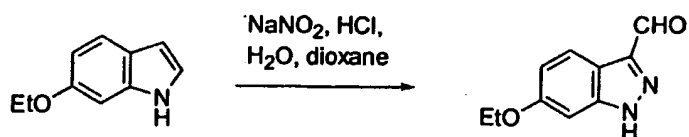
WO 03/004488

PCT/US02/20844

-300-

**EXAMPLE 755****1'-[2-(6-Ethoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]****Synthesis of 6-Ethoxy-1H-indole**

- 5 6-Hydroxyindole (1.0 equivalents) is dissolved in dry, degassed acetone. EtBr (5.0 equivalents) and Cs₂CO₃ (2.5 equivalents) are added, and the resulting solution is stirred for 18 hours. The reaction mixture is filtered through a Celite plug. The solvent is evaporated, and the product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the title compound.

10 Synthesis of 6-Ethoxy-1H-indazole-3-carbaldehyde

The formation of the title compound from 6-ethoxy-1H-indole is carried out using the procedure described above in Example 4.

Synthesis of 1'-[2-(6-Ethoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-**15 [1,4']bipiperidiny]**

The formation of the title compound is carried out using 6-ethoxy-1H-indazole-3-carbaldehyde and 4-[1,4']bipiperidiny-1'-yl-benzene-1,2-diamine using the method described above in Example 4.

WO 03/004488

PCT/US02/20844

-301-

EXAMPLES 756-767

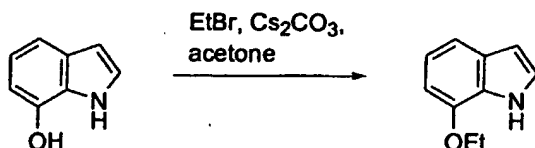
The compounds in the following table are synthesized using the procedures described above.

Example	Name
756	{4-[2-(6-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
757	{4-[2-(6-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
758	{4-[2-(6-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
759	(4-{2-[6-(1-ethyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
760	6-methoxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
761	6-isopropoxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
762	6-benzyloxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
763	6-(1-ethyl-piperidin-3-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
764	1'-[2-(6-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl
765	1'-[2-(6-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl
766	1'-[2-(6-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl
767	1'-{2-[6-(1-ethyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidinyl

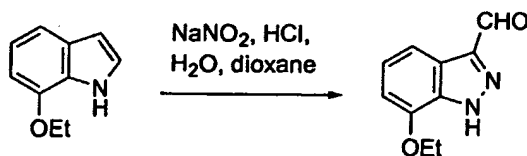
WO 03/004488

PCT/US02/20844

-302-

EXAMPLE 768**1'-[2-(7-Ethoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-Synthesis of 7-Ethoxy-1H-indole**

- 5 7-Hydroxyindole (1.0 equivalents) is dissolved in dry, degassed acetone. EtBr (5.0 equivalents) and Cs₂CO₃ (2.5 equivalents) are added, and the resulting solution is stirred for 18 hours. The reaction mixture is filtered through a Celite plug. The solvent is evaporated, and the product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the title compound.

10 Synthesis of 7-Ethoxy-1H-indazole-3-carbaldehyde

The formation of the title compound from 7-ethoxy-1H-indole is carried out using the procedure described above in Example 4.

Synthesis of 1'-[2-(7-Ethoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-**15 [1,4']bipiperidinyl**

The formation of the title compound is carried out using 7-ethoxy-1H-indazole-3-carbaldehyde and 4-[1,4']bipiperidinyl-1'-yl-benzene-1,2-diamine using the method described above in Example 4.

WO 03/004488

PCT/US02/20844

-303-

EXAMPLES 769-780

The compounds in the following table are synthesized using the procedures described above.

Example	Name
769	{4-[2-(7-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
770	{4-[2-(7-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
771	{4-[2-(7-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
772	(4-{2-[7-(1-ethyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
773	7-methoxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
774	7-isopropoxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
775	7-benzyloxy-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
776	7-(1-ethyl-piperidin-3-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
777	1'-[2-(7-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny1
778	1'-[2-(7-isopropoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny1
779	1'-[2-(7-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny1
780	1'-{2-[7-(1-ethyl-piperidin-3-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny1

EXAMPLES 781-792

5 The compounds in the following table are synthesized using the procedures described in Example 730.

Example	Name
781	dimethyl-(5-methyl-4-{2-[5-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
782	(4-{2-[5-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-

WO 03/004488

PCT/US02/20844

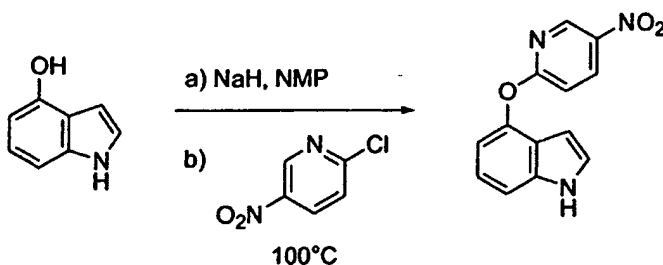
-304-

	amine
783	2-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yloxy}-nicotinonitrile
784	dimethyl-(5-methyl-4-{2-[5-(4-methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
785	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-(pyridin-2-yloxy)-1H-indazole
786	5-(3-methoxy-pyridin-2-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
787	2-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yloxy}-nicotinonitrile
788	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-(4-methyl-pyridin-2-yloxy)-1H-indazole
789	1'-{2-[5-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny1
790	1'-{2-[5-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny1
791	2-[3-(6-[1,4']bipiperidiny1-1'-yl-1H-benzoimidazol-2-yl)-1H-indazol-5-yloxy]-nicotinonitrile
792	1'-{2-[5-(4-methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny1

EXAMPLE 793

3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-4-(5-nitro-pyridin-2-yloxy)-1H-indazole

Synthesis of 4-(5-Nitropyridin-2-yloxy)-1H-indole



5

NaH (1.1 equivalents) is added to a solution of 4-hydroxyindole (1.0 equivalent) in NMP. The resulting mixture is stirred for 2 hours at room temperature. 2-Chloro-5-nitropyridine (1.1 equivalents) is added and the solution is

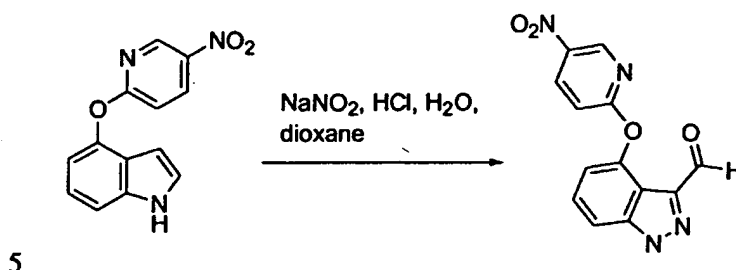
WO 03/004488

PCT/US02/20844

-305-

heated to 100°C for 2 hours. The solution is cooled and poured into water. The aqueous layer is extracted with EtOAc three times. The organic layers are combined and concentrated to yield the title compound.

Synthesis of 4-(5-Nitro-pyridin-2-yloxy)-1H-indazole-3-carbaldehyde



The formation of the title compound from 4-(5-nitropyridin-2-yloxy)-1H-indole is carried out using the procedure described above in Example 4.

Synthesis of 3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-4-(5-nitropyridin-2-yloxy)-1H-indazole

10 The formation of the title compound is carried out using 4-(5-nitropyridin-2-yloxy)-1H-indazole-3-carbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine using the method described above in Example 4.

EXAMPLES 794-805

15 The compounds in the following table are synthesized using the procedures described above.

Example	Name
794	dimethyl-(5-methyl-4-{2-[4-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
795	(4-{2-[4-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
796	2-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yloxy}-nicotinonitrile
797	dimethyl-(5-methyl-4-{2-[4-(4-methyl-pyridin-2-yloxy)-1H-indazol-

WO 03/004488

PCT/US02/20844

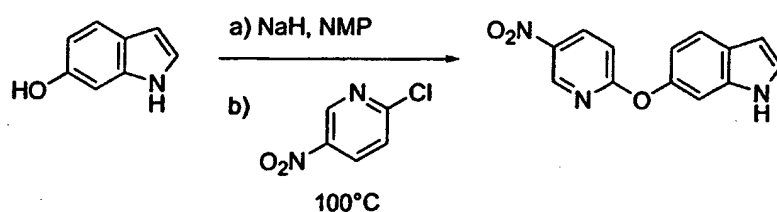
-306-

	3-yl]-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl)-amine
798	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-4-(pyridin-2-yloxy)-1H-indazole
799	4-(3-methoxy-pyridin-2-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
800	2-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yloxy}-nicotinonitrile
801	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-4-(4-methyl-pyridin-2-yloxy)-1H-indazole
802	1'-{2-[4-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl
803	1'-{2-[4-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl
804	2-[3-(6-[1,4']Bipiperidinyl-1'-yl-1H-benzoimidazol-2-yl)-1H-indazol-4-yloxy]-nicotinonitrile
805	1'-{2-[4-(4-Methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl

EXAMPLE 806

3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-6-(5-nitro-pyridin-2-yloxy)-1H-indazole

Synthesis of 6-(5-Nitropyridin-2-yloxy)-1H-indole



5

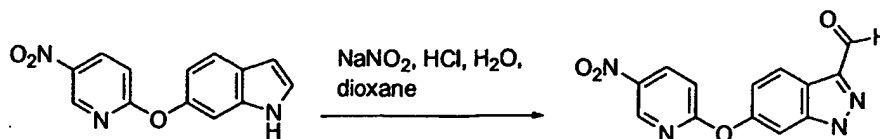
NaH (1.1 equivalents) is added to a solution of 6-hydroxyindole (1.0 equivalent) in NMP. The resulting mixture is stirred for 2 hours at room temperature. 2-Chloro-5-nitropyridine (1.1 equivalents) is added and the solution is heated to 100°C for 2 hours. The solution is cooled and poured into water. The aqueous layer is extracted with EtOAc three times. The organic layers are combined and concentrated to yield the titled compound.

10

WO 03/004488

PCT/US02/20844

-307-

Synthesis of 6-(5-Nitropyridin-2-yloxy)-1H-indazole-3-carbaldehyde

The formation of the title compound from 6-(5-nitropyridin-2-yloxy)-1H-indole is carried out using the procedure described in Example 4.

5 Synthesis of 3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-6-(5-nitropyridin-2-yloxy)-1H-indazole

The formation of the title compound is carried out using 6-(5-nitropyridin-2-yloxy)-1H-indazole-3-carbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine using the method described above in Example 4.

10

EXAMPLES 807-818

The compounds in the following table are synthesized using the procedures described above.

Example	Name
807	Dimethyl-(5-methyl-4-{2-[6-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
808	(4-{2-[6-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
809	2-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yloxy}-nicotinonitrile
810	Dimethyl-(5-methyl-4-{2-[6-(4-methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
811	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-6-(pyridin-2-yloxy)-1H-indazole
812	6-(3-methoxy-pyridin-2-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
813	2-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yloxy}-nicotinonitrile
814	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-6-(4-methyl-pyridin-2-yloxy)-1H-indazole

WO 03/004488

PCT/US02/20844

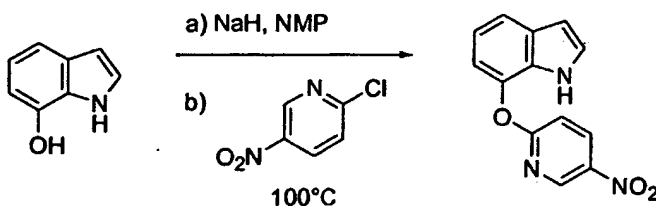
-308-

815	1'-{2-[6-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny]
816	1'-{2-[6-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny]
817	2-[3-(6-[1,4']bipiperidiny-1'-yl-1H-benzoimidazol-2-yl)-1H-indazol-6-yloxy]-nicotinonitrile
818	1'-{2-[6-(4-methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidiny]

EXAMPLE 819

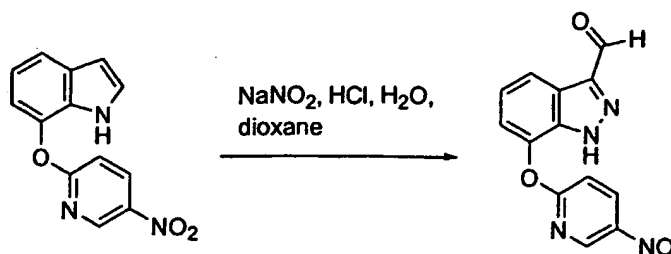
3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-7-(5-nitro-pyridin-2-yloxy)-1H-indazole

5 Synthesis of 7-(5-Nitropyridin-2-yloxy)-1H-indole



- NaH (1.1 equivalents) is added to a solution of 7-hydroxyindole (1.0 equivalent) in NMP. The resulting mixture is stirred for 2 hours at room temperature. 2-Chloro-5-nitropyridine (1.1 equivalents) is added and the solution is
- 10 heated to 100°C for 2 hours. The solution is cooled and poured into water. The aqueous layer is extracted with EtOAc three times. The organic layers are combined and concentrated to yield the desired indole heteroaryl ether.

Synthesis of 7-(5-Nitropyridin-2-yloxy)-1H-indazole-3-carbaldehyde



WO 03/004488

PCT/US02/20844

-309-

The formation of the title compound from 7-(5-nitropyridin-2-yloxy)-1H-indole is carried out using the procedure described above in Example 4.

Synthesis of 3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-7-(5-nitropyridin-2-yloxy)-1H-indazole

- 5 The formation of the title compound is carried out using 7-(5-nitropyridin-2-yloxy)-1H-indazole-3-carbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine using the method described above in Example 4.

EXAMPLES 820-831

- 10 The compounds in the following table are synthesized using the procedures described above.

Example	Name
820	dimethyl-(5-methyl-4-{2-[7-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
821	(4-{2-[7-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
822	2-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yloxy}-nicotinonitrile
823	dimethyl-(5-methyl-4-{2-[7-(4-methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-morpholin-2-ylmethyl)-amine
824	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-7-(pyridin-2-yloxy)-1H-indazole
825	7-(3-methoxy-pyridin-2-yloxy)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
826	2-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yloxy}-nicotinonitrile
827	3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-7-(4-methyl-pyridin-2-yloxy)-1H-indazole
828	1'-{2-[7-(pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidinyl
829	1'-{2-[7-(3-methoxy-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-[1,4']bipiperidinyl
830	2-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yloxy]-nicotinonitrile
831	1'-{2-[7-(4-methyl-pyridin-2-yloxy)-1H-indazol-3-yl]-3H-

WO 03/004488

PCT/US02/20844

-310-

	benzoimidazol-5-yl}-[1,4']bipiperidinyl
--	---

EXAMPLES 832-842

The compounds in the following table are synthesized using the procedures described in Example 685.

Example	Name
832	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-acetamide
833	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-2,2-dimethyl-propionamide
834	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-2,4-difluoro-benzamide
835	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-2-methoxy-benzamide
836	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-acetamide
837	2,2-dimethyl-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-propionamide
838	2,4-difluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-benzamide
839	2-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-benzamide
840	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-2,2-dimethyl-propionamide
841	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-2,4-difluoro-benzamide
842	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-2-methoxy-benzamide

5

EXAMPLES 843-854

The compounds in the following table are synthesized using the procedures described in Example 688.

Example	Name
843	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-C,C,C-trifluoro-methanesulfonamide

WO 03/004488

PCT/US02/20844

-311-

844	thiophene-2-sulfonic acid {3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-amide
845	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-benzenesulfonamide
846	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-4-methoxy-benzenesulfonamide
847	C,C,C-trifluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-methanesulfonamide
848	thiophene-2-sulfonic acid {3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-amide
849	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-benzenesulfonamide
850	4-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-benzenesulfonamide
851	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl]-C,C,C-trifluoro-methanesulfonamide
852	thiophene-2-sulfonic acid [3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-amide
853	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-benzenesulfonamide
854	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl]-4-methoxy-benzenesulfonamide

EXAMPLES 855-865

The compounds in the following table are synthesized using the procedures described in Example 685 using 3-benzimidazol-2-yl-1H-indazol-6-ylamine as the starting material.

Example	Name
855	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-acetamide
856	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-2,2-dimethyl-propionamide
857	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-2,4-difluoro-benzamide
858	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-2-methoxy-benzamide
859	2,2-dimethyl-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-propionamide

WO 03/004488

PCT/US02/20844

-312-

860	2,4-difluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-benzamide
861	2-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-benzamide
862	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl]-acetamide
863	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl]-2,2-dimethyl-propionamide
864	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl]-2,4-difluoro-benzamide
865	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl]-2-methoxy-benzamide

EXAMPLES 866-877

The compounds in the following table are synthesized using the procedures described in Example 688 using 3-benzimidazol-2-yl-1H-indazol-6-ylamine as the starting material.

Example	Name
866	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-C,C,C-trifluoro-methanesulfonamide
867	thiophene-2-sulfonic acid {3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-amide
868	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-benzenesulfonamide
869	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-4-methoxy-benzenesulfonamide
870	C,C,C-trifluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-methanesulfonamide
871	thiophene-2-sulfonic acid {3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-amide
872	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-benzenesulfonamide
873	4-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl}-benzenesulfonamide
874	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-yl]-C,C,C-trifluoro-methanesulfonamide
875	Thiophene-2-sulfonic acid [3-(6-[1,4']bipiperidinyl-1'-yl)-1H-

WO 03/004488

PCT/US02/20844

-313-

	benzoimidazol-2-yl)-1H-indazol-6-yl]-amide
876	N-[3-(6-[1,4']bipiperidiny1-1'-yl)-1H-benzoimidazol-2-yl)-1H-indazol-6-yl]-benzenesulfonamide
877	N-[3-(6-[1,4']bipiperidiny1-1'-yl)-1H-benzoimidazol-2-yl)-1H-indazol-6-yl]-4-methoxy-benzenesulfonamide

EXAMPLE 878

N-{3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-benzamide

- 5 3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-ylamine is dissolved in CH₂Cl₂ and benzoyl chloride (1.1 equivalent) is added followed by diisopropylethylamine (1.1 equivalent). The resulting mixture is stirred overnight. The solution is then concentrated and the resulting residue is purified by preparatory HPLC to provide the title compound.

10

EXAMPLES 879-890

The compounds in the following table are synthesized using the procedures described above.

Example	Name
879	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-acetamide
880	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-2,2-dimethyl-propionamide
881	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-2,4-difluoro-benzamide
882	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-2-methoxy-benzamide
883	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-acetamide
884	2,2-dimethyl-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-propionamide
885	2,4-difluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-benzamide

WO 03/004488

PCT/US02/20844

-314-

886	2-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-benzamide
887	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-acetamide
888	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-2,2-dimethyl-propionamide
889	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-2,4-difluoro-benzamide
890	N-[3-(6-[1,4']Bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-2-methoxy-benzamide

EXAMPLE 891

N-{3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-methanesulfonamide

5 3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-ylamine (1 equivalent), methanesulfonyl chloride (1.1 equivalent), and diisopropylethylamine (2 equivalents) in CH₂Cl₂ are stirred for 18 hours. The solvent is evaporated, and the resulting residue is purified by preparatory HPLC to provide the title compound.

10

EXAMPLES 892-903

The compounds in the following table are synthesized using the procedures described above.

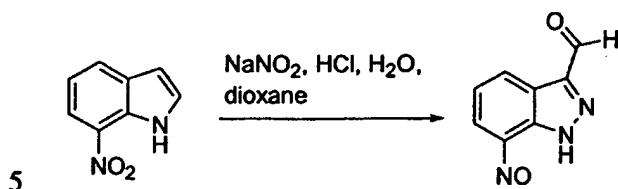
Example	Name
892	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-C,C,C-trifluoro-methanesulfonamide
893	thiophene-2-sulfonic acid {3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-amide
894	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-benzenesulfonamide
895	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-4-methoxy-benzenesulfonamide

WO 03/004488

PCT/US02/20844

-315-

896	C,C,C-trifluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-methanesulfonamide
897	thiophene-2-sulfonic acid {3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-amide
898	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-benzenesulfonamide
899	4-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl}-benzenesulfonamide
900	N-[3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-C,C,C-trifluoro-methanesulfonamide
901	thiophene-2-sulfonic acid [3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-amide
902	N-[3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-benzenesulfonamide
903	N-[3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-yl]-4-methoxy-benzenesulfonamide

EXAMPLE 904**3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-7-nitro-1H-indazole****Synthesis of 7-Nitro-1H-indazole-3-carbaldehyde**

The formation of 7-nitro-1H-indazole-3-carbaldehyde is carried out from the commercially available 7-nitroindole using the method described above in Example 4.

10 **Synthesis of 3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-7-nitro-1H-indazole**

The formation of the title compound from 7-nitro-1H-indazole-3-carbaldehyde and 4-(4-methylpiperazin-1-yl)benzene-1,2-diamine is carried out using the procedure described above in Example 4.

WO 03/004488

PCT/US02/20844

-316-

EXAMPLE 905**3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ylamine**

The title compound is obtained by reducing the nitro group of 3-[6-(4-methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-7-nitro-1H-indazole of Example 5 742 using the method described in Method 1.

EXAMPLE 906**N-{3-[6-(4-Methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-benzamide**

The 3-[6-(4-methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ylamine of Example 743 is dissolved in CH₂Cl₂ and benzoyl chloride (1.1 equivalent) is added followed by diisopropylethylamine (1.1 equivalent). The resulting mixture is stirred overnight. The solution is then concentrated and the resulting residue is purified by preparatory HPLC to provide the title compound.

EXAMPLES 907-918

15 The compounds in the following table are synthesized using the procedures described above.

Example	Name
907	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-acetamide
908	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-2,2-dimethyl-propionamide
909	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-2,4-difluoro-benzamide
910	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-2-methoxy-benzamide
911	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-acetamide
912	2,2-dimethyl-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-propionamide

WO 03/004488

PCT/US02/20844

-317-

913	2,4-difluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-benzamide
914	2-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-benzamide
915	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-acetamide
916	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-2,2-dimethyl-propionamide
917	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-2,4-difluoro-benzamide
918	N-[3-(6-[1,4']bipiperidinyl-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-2-methoxy-benzamide

EXAMPLE 919

N-{3-[6-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-methanesulfonamide

5 3-[6-(4-methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ylamine (1 equivalent), methanesulfonyl chloride (1.1 equivalent), and diisopropylethylamine (2 equivalents) in CH₂Cl₂ are stirred for 18 hours. The solvent is evaporated, and the resulting residue is purified by preparatory HPLC to provide the title compound.

10

EXAMPLES 920-931

The compounds in the following table are synthesized using the procedures described above.

Example	Name
920	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-C,C,C-trifluoro-methanesulfonamide
921	thiophene-2-sulfonic acid {3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-amide
922	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-benzenesulfonamide
923	N-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-4-methoxy-

WO 03/004488

PCT/US02/20844

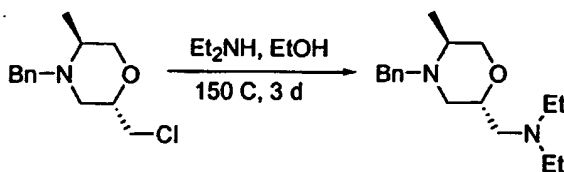
-318-

	benzenesulfonamide
924	C,C,C-trifluoro-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-methanesulfonamide
925	thiophene-2-sulfonic acid {3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-amide
926	N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-benzenesulfonamide
927	4-methoxy-N-{3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl}-benzenesulfonamide
928	N-[3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-C,C,C-trifluoro-methanesulfonamide
929	thiophene-2-sulfonic acid [3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-amide
930	N-[3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-benzenesulfonamide
931	N-[3-(6-[1,4']bipiperidiny-1'-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-yl]-4-methoxy-benzenesulfonamide

EXAMPLE 932

((2R,5S)-4-[2-(6-Fluoro(1H-indazol-3-yl))benzimidazol-6-yl]-5-methylmorpholin-2-yl)methyl}diethylamine

5 Synthesis of {[(2R,5S)-5-Methyl-4-benzylmorpholin-2-yl]methyl}diethylamine



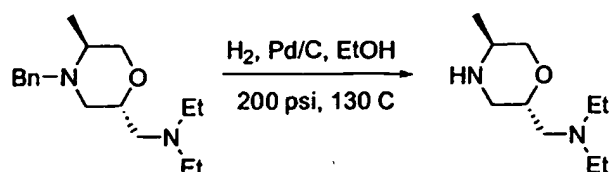
The title compound is obtained from (2S,5S)-2-(chloromethyl)-5-methyl-4-benzylmorpholine (see Method 8 Steps 1 and 2) displacing the chloride with diethylamine under the same reaction conditions used in Method 8 Step 3.

10 Synthesis of {[(2S,5S)-5-Methylmorpholin-2-yl]methyl}diethylamine

WO 03/004488

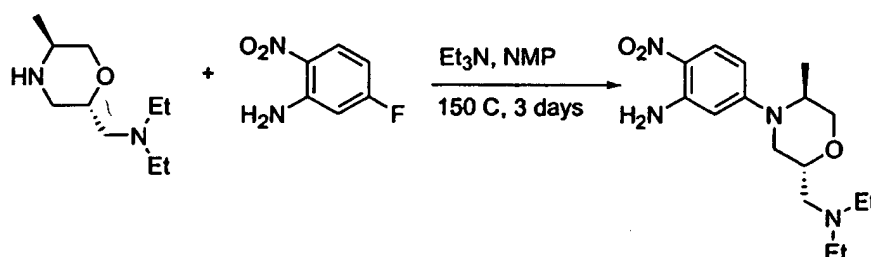
PCT/US02/20844

-319-



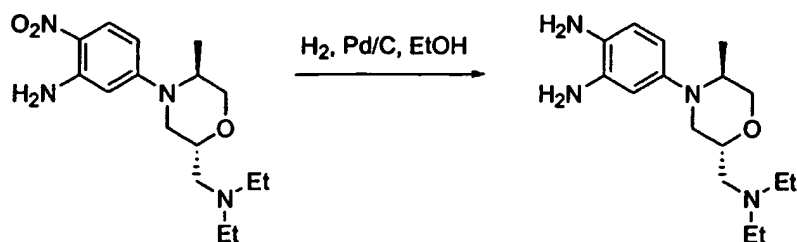
The formation of the title compound is carried out using the same procedure described in Method 8 Step 4 from {[(5S,2R)-5-methyl-4-benzylmorpholin-2-yl]methyl}diethylamine.

5 Synthesis of {[(2R,5S)-4-(3-Amino-4-nitrophenyl)-5-methylmorpholin-2-yl]methyl}diethylamine



The formation of the title compound is carried out using the same procedure described in Method 8 Step 5 using [((2S,5S)-5-methylmorpholin-2-yl)methyl]diethylamine and 5-fluoro-2-nitro-phenylamine.

10 Synthesis of {[(2R,5S)-4-(3,4-Diaminophenyl)-5-methylmorpholin-2-yl]methyl}diethylamine



The formation of the title compound is carried out using the same procedure described in Method 8 Step 6 {[(2R,5S)-4-(3-amino-4-nitrophenyl)-5-methylmorpholin-2-yl]methyl}diethylamine.

WO 03/004488

PCT/US02/20844

-320-

Synthesis of ((2R,5S)-4-[2-(6-Fluoro(1H-indazol-3-yl))benzimidazol-6-yl]-5-methylmorpholin-2-yl)methyl)diethylamine

The title compound is synthesized according to the general procedure described in Example 4 with {[(2R,5S)-4-(3,4-diaminophenyl)-5-methylmorpholin-2-yl)methyl}diethylamine and 6-fluoro-1H-indazole-3-carbaldehyde.

EXAMPLES 933-940

The compounds in the following table are synthesized using the procedures described above in Example 932.

Example	Name
933	(2R,5S)-diethyl-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
934	(2R,5S)-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
935	(2R,5S)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-diethyl-amine
936	(2R,5S)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
937	(2R,5S)-diethyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
938	(2R,5S)-isopropyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-methyl-amine
939	(2R,5S)-3-[6-(2-azetidin-1-ylmethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole
940	(2R,5S)-6-fluoro-3-[6-(5-methyl-2-pyrrolidin-1-ylmethyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole

10

EXAMPLES 941-964

The compounds in the following table are synthesized using the procedures described above in Example 932 starting from the appropriate (2S,5R)-2-(chloromethyl)-5-methyl-4-benzylmorpholine, (2R,5S)-2-(chloromethyl)-5-methyl-4-benzylmorpholine, or (2R,5R)-2-(chloromethyl)-5-methyl-4-benzylmorpholine.

WO 03/004488

PCT/US02/20844

-321-

Example	Name
941	(2S,5S)-diethyl-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
942	(2S,5S)-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
943	(2S,5S)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-diethyl-amine
944	(2S,5S)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
945	(2S,5S)-diethyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
946	(2S,5S)-isopropyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-methyl-amine
947	(2S,5S)-3-[6-(2-azetidin-1-ylmethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole
948	(2S,5S)-6-fluoro-3-[6-(5-methyl-2-pyrrolidin-1-ylmethyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole
949	(2S,5R)-diethyl-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
950	(2S,5R)-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
951	(2S,5R)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-diethyl-amine
952	(2S,5R)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
953	(2S,5R)-diethyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
954	(2S,5R)-isopropyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-methyl-amine
955	(2S,5R)-3-[6-(2-azetidin-1-ylmethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole
956	(2S,5R)-6-fluoro-3-[6-(5-methyl-2-pyrrolidin-1-ylmethyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole
957	(2R,5R)-diethyl-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
958	(2R,5R)-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
959	(2R,5R)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-diethyl-amine
960	(2R,5R)-{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-isopropyl-methyl-amine
961	(2R,5R)-diethyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-

WO 03/004488

PCT/US02/20844

-322-

	benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-amine
962	(2R,5R)-isopropyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-methyl-amine
963	(2R,5R)-3-[6-(2-azetidin-1-ylmethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole
964	(2R,5R)-6-fluoro-3-[6-(5-methyl-2-pyrrolidin-1-ylmethyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole

EXAMPLES 965-972

The compounds in the following table are synthesized using the procedures described above in Example 932 using (S)-(+)-2-amino-1-butanol or
 5 (R)-(-)-2-amino-1-butanol and performing the displacement on the chloromethyl intermediate with dimethylamine or diethylamine.

Example	Name
965	(2R,5S)-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-dimethyl-amine
966	(2R,5S)-diethyl-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-amine
967	(2R,5R)-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-dimethyl-amine
968	(2R,5R)-diethyl-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-amine
969	(2S,5S)-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-dimethyl-amine
970	(2S,5S)-diethyl-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-amine
971	(2S,5R)-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-dimethyl-amine
972	(2S,5R)-diethyl-{5-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-morpholin-2-ylmethyl}-amine

EXAMPLES 973-983

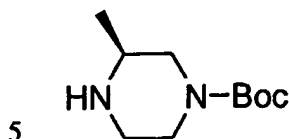
The following compounds are synthesized as previously described
 10 using 4-amino-1-propanol as a starting material and performing the displacement on the chloromethyl intermediate with commercially available secondary amines.

WO 03/004488

PCT/US02/20844

-323-

Example	Name
973	{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-dimethyl-amine
974	diethyl-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-amine
975	{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-dimethyl-amine
976	{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-diethyl-amine
977	diethyl-{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-amine
978	{4-[2-(5-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-diethyl-amine
979	diethyl-{4-[2-(5-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-amine
980	diethyl-{4-[2-(5-phenoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-amine
981	{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4]oxazepan-2-ylmethyl}-isopropyl-methyl-amine
982	3-[6-(2-azetidin-1-ylmethyl-[1,4]oxazepan-4-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole
983	6-fluoro-3-[6-(2-pyrrolidin-1-ylmethyl-[1,4]oxazepan-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole

EXAMPLE 984**3-[6-((3S)-3,4-Dimethylpiperazinyl)benzimidazol-2-yl]-6-fluoro-1H-indazole****Synthesis of (3S)-3-Methylpiperazine-1-carboxylic acid tert-butyl ester**

To a stirred solution of (2S)-2-methylpiperazine (2 equivalents) in dichloromethane at -10°C , di-tert-butyl dicarbonate (1 equivalent) was added. The mixture was stirred at -10°C for two minutes, and subsequently quenched with saturated aqueous NaHCO_3 . The two phases were separated, and the organic layer

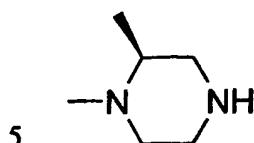
WO 03/004488

PCT/US02/20844

-324-

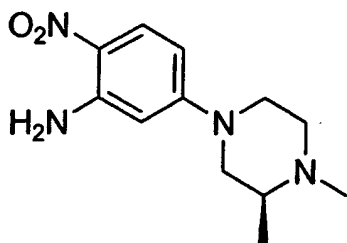
was extracted with methylene chloride. The organic extracts were collected, dried over Na_2SO_4 , and concentrated to give the desired product. LC/MS (m/z) 201.0 (MH^+), R_t 1.67 minutes.

Synthesis of (2S)-1,2-Dimethyl-piperazine



(3S)-3-Methylpiperazine-1-carboxylic acid tert-butyl ester (1 equivalent) and paraformaldehyde (5 equivalents) were dissolved in a mixture of MeOH and AcOH (5:1) on molecular sieves. NaCNBH_3 (4 equivalents) was added to the suspension at 25°C . The slurry was subsequently heated to 80°C . After 10 hours, the mixture was cooled, filtered, and concentrated. The residue was dissolved in dichloromethane and washed with saturated aqueous NaHCO_3 . The organic solution was dried (Na_2SO_4), and concentrated. The tert-butoxycarbonyl group was removed by treating the crude amine with saturated HCl in MeOH at room temperature for 30 minutes. The mixture was then concentrated and excess HCl was removed in-vacuo. The desired (2S)-1,2-dimethylpiperazine was thus obtained as the bis HCl salt. LC/MS (m/z) 115.0 (MH^+), R_t 0.33 minutes.

Synthesis of 5-(3S)-(3,4-Dimethyl-piperazin-1-yl)-2-nitro-phenylamine

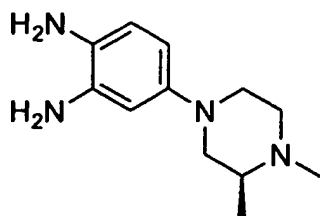


The title compound was prepared from (2S)-1,2-dimethylpiperazine using the procedure described in Method 8 Step 5. LC/MS (m/z) 251.3 (MH^+), R_t 1.48 minutes.

WO 03/004488

PCT/US02/20844

-325-

Synthesis of 4-(3S)-(3,4-Dimethyl-piperazin-1-yl)-benzene-1,2-diamine

The title compound was prepared by reducing 5-(3S)-(3,4-dimethyl-piperazin-1-yl)-2-nitro-phenylamine using the procedure described in Method 8 Step

5 6.

Synthesis of 3-[6-(3S)-(3,4-Dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole

The title compound is synthesized from 4-(3S)-(3,4-dimethyl-piperazin-1-yl)-benzene-1,2-diamine using the procedure described in Example 4.

10

EXAMPLES 985-988

The following compounds are synthesized as previously described using of 4-(3S)-(3,4-dimethyl-piperazin-1-yl)-benzene-1,2-diamine.

Example	Name
985	5-chloro-3-[6-(3S)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
986	6-chloro-3-[6-(3S)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
987	3-[6-(3S)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-methoxy-1H-indazole
988	3-[6-(3S)-(3,4-Dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-fluoro-1H-indazole

EXAMPLES 989-993

15

The following compounds are synthesized as previously described in Example 984 starting from (2R)-2-methylpiperazine.

WO 03/004488

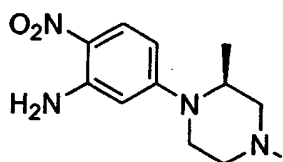
PCT/US02/20844

-326-

Example	Name
989	5-chloro-3-[6-(3R)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
990	6-chloro-3-[6-(3R)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
991	3-[6-(3R)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-6-fluoro-1H-indazole
992	3-[6-(3R)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-fluoro-1H-indazole
993	3-[6-(3R)-(3,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-methoxy-1H-indazole

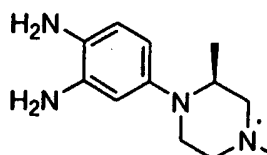
EXAMPLE 994**6-Chloro-3-[6-((2S)-2-methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole**

Synthesis of tert-Butyl (3S)-4-(3-amino-4-nitrophenyl)-3-methylpiperazinecarboxylate



The title compound was synthesized as described in Method 8 Step 5 from tert-butyl (3S)-3-methylpiperazine carboxylate (see Example 984). LC/MS (m/z) 281.3 (MH⁺), R_t 2.90 minutes.

10 Synthesis of tert-butyl (3S)-4-(3,4-diaminophenyl)-3-methylpiperazine-carboxylate



WO 03/004488

PCT/US02/20844

-327-

The title compound is synthesized as described in Method 8 Step 6 using tert-butyl (3S)-4-(3-amino-4-nitrophenyl)-3-methylpiperazinecarboxylate.

Synthesis of 6-Chloro-3-[6-((2S)-2-methylpiperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

- 5 The title compound is synthesized from (3S)-4-(3,4-diaminophenyl)-3-methylpiperazinecarboxylate using the procedure described in Example 4. The tert-butoxycarbonyl protecting groups is removed by treatment with saturated HCl in MeOH.

EXAMPLE 995

- 10 **3-[6-((2S)-2,4-dimethylpiperazinyl)benzimidazol-2-yl]-6-chloro-1H-indazole**

Synthesis of 3-[6-((2S)-2,4-dimethylpiperazinyl)benzimidazol-2-yl]-6-chloro-1H-indazole

- 3-[6-((2S)-2-methylpiperazinyl)benzimidazol-2-yl]-6-chloro-1H-indazole (1 equivalent) is dissolved in a mixture of MeOH and acetic acid (10:1), on
15 molecular sieves. Paraformaldehyde (10 equivalents) is added in one portion. The reaction mixture is stirred at room temperature overnight then solid NaCNBH₃ is added in small portions. The reaction mixture is refluxed for 5 hours, cooled to room temperature, filtered, and concentrated under reduced pressure. The residue is dissolved in dichloromethane and washed with saturated aqueous NaHCO₃. The
20 organic solution is dried over Na₂SO₄, and the solvent removed under reduced pressure to afford the desired product.

EXAMPLES 996-1005

- The following compounds are synthesized from: 3-[6-((2S)-2-methylpiperazinyl)benzimidazol-2-yl]-6-chloro-1H-indazole and 3-[6-((2R)-2-methylpiperazinyl)benzimidazol-2-yl]-6-chloro-1H-indazole according to the
25 procedures described above in examples 994 and 995.

WO 03/004488

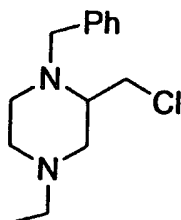
PCT/US02/20844

-328-

Example	Name
996	6-chloro-3-[6-((2S)-4-ethyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
997	6-chloro-3-[6-((2S)-4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
998	6-chloro-3-[6-((2S)-4-cyclobutyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
999	6-chloro-3-[6-((2R)-2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1000	6-chloro-3-[6-((2R)-4-ethyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1001	6-chloro-3-[6-((2R)-4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1002	6-chloro-3-[6-((2R)-4-cyclobutyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1003	6-fluoro-3-[6-((2S)-4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1004	5-chloro-3-[6-((2S)-4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1005	3-[6-((2S)-4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-5-methoxy-1H-indazole

EXAMPLE 1006

((4-[2-(6-Fluoro(1H-indazol-3-yl))benzimidazol-6-yl]-1-methylpiperazin-2-yl)methyl)dimethylamine

5 Synthesis of 1,4-Bisbenzyl-2-(chloromethyl)piperazine

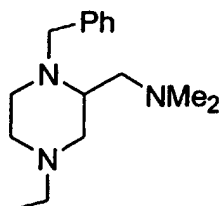
The title compound was synthesized as previously described in U.S. Patent No. 4,940,710 incorporated herein by reference.

WO 03/004488

PCT/US02/20844

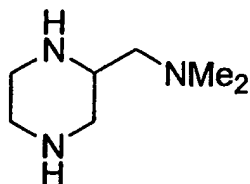
-329-

Synthesis of {[1,4-Bisbenzylpiperazin-2-yl]methyl}dimethylamine



A mixture of 1,4-bisbenzyl-2-(chloromethyl)piperazine (1 equivalent) and dimethylamine (5 equivalents) in ethanol, was heated at 150°C for 36 hours in a sealed high pressure vessel. The reaction mixture was cooled to room temperature and concentrated under reduced pressure. The residue was taken up in 1 N HCl, and the solution was washed with CH₂Cl₂. The water phase was made basic with a 30% aqueous NaOH solution (pH=12) and extracted with CH₂Cl₂. The organic extracts were collected and dried over Na₂SO₄. Evaporation of the solvent under reduced pressure afforded {[1,4-bisbenzylpiperazin-2-yl)methyl}dimethylamine. LC/MS (m/z): 324.3 (MH⁺), R_t 1.76 minutes.

Synthesis of Dimethyl(piperazin-2-ylmethyl)amine

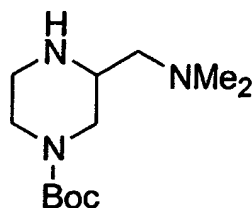


{[1,4-bisbenzylpiperazin-2-yl)methyl}dimethylamine (1 equivalent),
15 was dissolved in EtOH and the solution was transferred to a stainless steel high
pressure vessel equipped with a pressure gauge. 10% Pd/C was added (10 wt. %),
and the vessel charged with H₂. The reaction mixture was stirred at 130°C and 200
psi of H₂ overnight. The reaction mixture was cooled to room temperature, filtered
over a pad of Celite, and then evaporated. The desired amine was obtained in
20 quantitative yield as a pale yellow oil. GC/MS : 143 (10%, M+), R_t= 14.3
minutes.

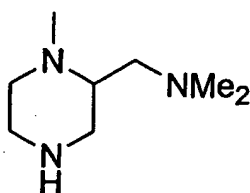
WO 03/004488

PCT/US02/20844

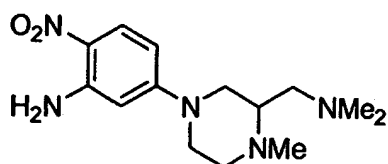
-330-

Synthesis of tert-butyl 3-[(dimethylamino)methyl]piperazine-carboxylate

- The title compound was synthesized from dimethyl(piperazin-2-ylmethyl)amine using the procedure described in example 984. GC/MS : 170
- 5 (20%, M+-tBuO), R_t = 13.5 minutes.

Synthesis of Dimethyl[(1-methylpiperazin-2-yl)methyl]amine

- The title compound was synthesized from tert-butyl 3-[(dimethylamino)methyl]piperazinecarboxylate using the procedure described in
- 10 example 984. Purification by column chromatography on silica gel afforded the Boc protected amine which was treated with HCl in MeOH to afford the desired product. LC/MS (m/z): 158.1 (MH⁺), R_t 0.27 minutes.

Synthesis of {[4-(3-amino-4-nitrophenyl)-1-methylpiperazin-2-yl)methyl}dimethylamine

15

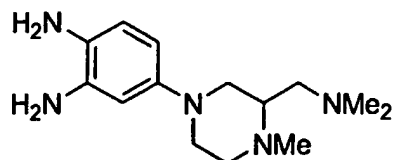
- The title compound was synthesized from dimethyl[(1-methylpiperazin-2-yl)methyl]amine using the procedure described in Method 8 Step
5. LC/MS (m/z): 294.1 (MH⁺), R_t 1.11 minutes.

WO 03/004488

PCT/US02/20844

-331-

Synthesis of {[4-(3,4-diaminophenyl)-1-methylpiperazin-2-yl]methyl}dimethylamine



- The title compound is synthesized from {[4-(3-amino-4-nitrophenyl)-1-methylpiperazin-2-yl]methyl}dimethylamine using the procedure described in Method 8 Step 6.

Synthesis of ({4-[2-(6-fluoro(1H-indazol-3-yl))benzimidazol-6-yl]-1-methylpiperazin-2-yl}methyl)dimethylamine

- The title compound is synthesized from {[4-(3,4-diaminophenyl)-1-methylpiperazin-2-yl]methyl}dimethylamine using the procedure described in Example 4.

EXAMPLES 1007-1012

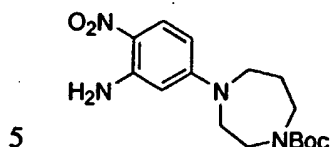
The following compounds are synthesized according to the procedure described above in Example 1006.

Example	Name
1007	{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-1-methylpiperazin-2-ylmethyl}-dimethyl-amine
1008	{4-[2-(5-methoxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-1-methyl-piperazin-2-ylmethyl}-dimethyl-amine
1009	{4-[2-(5-benzyloxy-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-1-methyl-piperazin-2-ylmethyl}-dimethyl-amine
1010	{4-[2-(6-chloro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-1-ethyl-piperazin-2-ylmethyl}-dimethyl-amine
1011	Diethyl-{4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-1-methyl-piperazin-2-ylmethyl}-amine
1012	Diethyl-{1-ethyl-4-[2-(6-fluoro-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-piperazin-2-ylmethyl}-amine

WO 03/004488

PCT/US02/20844

-332-

EXAMPLE 1013**3-(6-(1,4-Diazaperhydroepinyl)benzimidazol-2-yl)-6-fluoro-1H-indazole****Synthesis of tert-Butyl 4-(3-amino-4-nitrophenyl)-1,4-diazaperhydroepinecarboxylate**

The title compound is synthesized from commercially available Boc-homopiperazine according to the procedure described in Method 1.

Synthesis of 3-(6-(1,4-Diazaperhydroepinyl)benzimidazol-2-yl)-6-fluoro-1H-indazole

10 The title compound is synthesized from tert-butyl 4-(3-amino-4-nitrophenyl)-1,4-diazaperhydroepinecarboxylate after the nitro group has been reduced according to the procedure described in Example 4. The tert-butoxycarbonyl is removed treating with saturated HCl in MeOH.

EXAMPLE 1014

15 **6-Fluoro-3-[6-(4-methyl(1,4-diazaperhydroepinyl))benzimidazol-2-yl]-1H-indazole**

Synthesis of 6-Fluoro-3-[6-(4-methyl(1,4-diazaperhydroepinyl))-benzimidazol-2-yl]-1H-indazole

20 The title compound is synthesized from 3-(6-(1,4-diazaperhydroepinyl)benzimidazol-2-yl)-6-fluoro-1H-indazole according to the procedure in Examples 984 and 985.

WO 03/004488

PCT/US02/20844

-333-

EXAMPLES 1015-1018

The following compounds are synthesized according to the procedure described above in Example 1014 using an appropriate carbonyl compound.

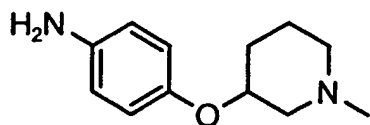
Example	Name
1015	6-Fluoro-3-[6-(4-ethyl(1,4-diazaperhydroepinyl))-benzimidazol-2-yl]-1H-indazole
1016	6-Fluoro-3-[6-(4-isopropyl(1,4-diazaperhydroepinyl))-benzimidazol-2-yl]-1H-indazole
1017	6-Fluoro-3-[6-(4-cyclobutyl(1,4-diazaperhydroepinyl))-benzimidazol-2-yl]-1H-indazole

5

EXAMPLE 1019

2-(6-Fluoro(1H-indazol-3-yl))-6-(1-methyl(3-piperidyloxy))-benzimidazole

Synthesis of 4-(1-Methyl-3-piperidyloxy)phenylamine

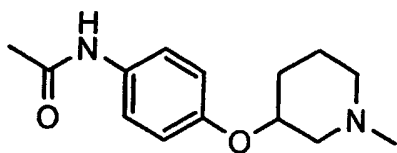


- KHMDS (1.1 equivalent) was added to a THF solution of 1-
- 10 methylpiperidin-3-ol (1 equivalent) at 0°C and stirred until H₂ evolution ceased. 1-fluoro-4-nitrobenzene (1 equivalent) was then added and the solution was allowed to warm to room temperature. After 2 hours, water was added and the mixture was extracted with EtOAc (3x). The combined organic extracts were dried over Na₂SO₄, and concentrated in vacuo to give a bright yellow oil which was directly
- 15 used in the reduction step. The oil (1 equivalent) and a catalytic amount of 10% Pd/C were suspended in anhydrous EtOH at room temperature. The reaction flask was evacuated and subsequently filled with H₂. After stirring for 18 hours, the mixture was filtered through Celite, and the solvent was concentrated in vacuo to yield 4-(1-methyl-3-piperidyloxy)phenylamine. LC/MS (m/z) 207.2 (MH⁺), R_f
- 20 0.47 minutes.

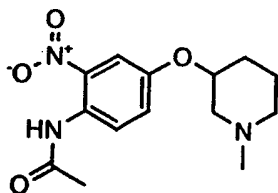
WO 03/004488

PCT/US02/20844

-334-

Synthesis of N-[4-(1-Methyl-3-piperidyloxy)phenyl]acetamide

- 4-(1-methyl-3-piperidyloxy)phenylamine (1 equivalent) was dissolved in CH_2Cl_2 and a catalytic amount of DMAP was added. Acetic anhydride (1.3 equivalents) was added slowly, and the solution was stirred at room temperature overnight. The reaction was then quenched with water and the aqueous layer was extracted with CH_2Cl_2 (3x). The combined organic extracts were dried over Na_2SO_4 and concentrated in vacuo, to yield N-[4-(1-methyl-3-piperidyloxy)phenyl]acetamide as a yellow oil. LC/MS (m/z) 249.3 (MH^+), R_t 1.24 minutes.

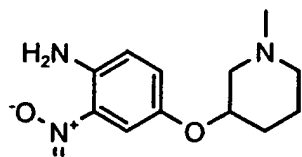
10 Synthesis of N-[4-(1-Methyl(3-piperidyloxy))-2-nitrophenyl]-acetamide

- A mixture of $\text{HNO}_3/\text{H}_2\text{SO}_4$ (1:1, 60% HNO_3 :concentrated H_2SO_4) cooled to 0°C was added dropwise to N-[4-(1-methyl-3-piperidyloxy)phenyl]-acetamide to form a 0.16 M solution. The solution was stirred at 0°C for 10 minutes and then at room temperature for 30 minutes. The solution was then diluted with water and made basic ($\text{pH} = 10$) with 6 N NaOH. The mixture was then extracted with CH_2Cl_2 (5x), dried over Na_2SO_4 , and concentrated *in vacuo* to yield N-[4-(1-methyl(3-piperidyloxy))-2-nitrophenyl]acetamide. LC/MS (m/z) 294.0 (MH^+), R_t 1.24 minutes.

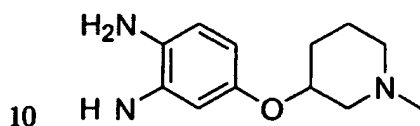
WO 03/004488

PCT/US02/20844

-335-

Synthesis of 4-(1-Methyl(3-piperidyloxy))-2-nitrophenylamine

- 5 N-[4-(1-methyl(3-piperidyloxy))-2-nitrophenyl]acetamide was dissolved in 1:1 MeOH : 6N NaOH (aq) solution (0.03 M). After stirring at room temperature for 2 hours, MeOH was removed *in vacuo*. The remaining solution was extracted with EtOAc (3x). The combined organic extracts were then dried over Na₂SO₄ and concentrated *in vacuo* to give 4-(1-methyl(3-piperidyloxy))-2-nitrophenylamine.

Synthesis of 4-(1-Methyl-3-piperidyloxy)benzene-1,2-diamine

The title compound is synthesized from 4-(1-methyl(3-piperidyloxy))-2-nitrophenylamine using the procedure described in Method 1.

Synthesis of 2-(6-fluoro(1H-indazol-3-yl))-6-(1-methyl(3-piperidyloxy))benzimidazole

- 15 The title compound is synthesized from 4-(1-Methyl-3-piperidyloxy)benzene-1,2-diamine using the procedure described in Example 4.

WO 03/004488

PCT/US02/20844

-336-

EXAMPLES 1020-1023

The following compounds are synthesized according to the procedure described above in Example 1019.

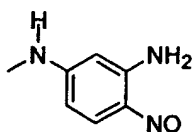
Example	Name
1020	6-chloro-3-[6-(1-methyl-piperidin-3-yloxy)-1H-benzoimidazol-2-yl]-1H-indazole
1021	5-methoxy-3-[6-(1-methyl-piperidin-3-yloxy)-1H-benzoimidazol-2-yl]-1H-indazole
1022	5-benzyloxy-3-[6-(1-methyl-piperidin-3-yloxy)-1H-benzoimidazol-2-yl]-1H-indazole
1023	3-[6-(1-methyl-piperidin-3-yloxy)-1H-benzoimidazol-2-yl]-1H-5,7-dioxa-1,2-diaza-s-indacene

5

EXAMPLE 1024

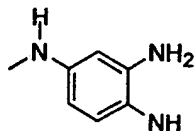
[2-(1H-Indazol-3-yl)-3H-benzoimidazol-5-yl]-methyl-amine

Synthesis of N¹-Methyl-4-nitro-benzene-1,3-diamine



The title compound was synthesized according to the procedure described in Method 1. LC/MS (m/z) 168.3 (MH⁺), R_t 1.78 minutes.

Synthesis of N⁴-Methylbenzene-1,2,4-triamine



The title compound is synthesized by reducing N¹-methyl-4-nitro-benzene-1,3-diamine using the procedure described above in Method 8 Step 6.

WO 03/004488

PCT/US02/20844

-337-

Synthesis of [2-(1H-Indazol-3-yl)-3H-benzoimidazol-5-yl]-methyl- amine

The title compound is synthesized from N⁴-methylbenzene-1,2,4-triamine using the procedure described above in Example 4.

EXAMPLES 1025-1033

- 5 The following nitroaniline compounds were synthesized according to the procedure described above in Example 1024 starting from the appropriate commercially available amine. The spirocyclic materials used to prepare some of the examples in the following table were synthesized using the procedure following the table.

Example	Name	LC/MS (m/z) (MH ⁺)	R _t (minutes)
1025	N ¹ -(2-dimethylamino-1-methyl-ethyl)-4-nitro-benzene-1,3-diamine	239.4	1.53
1026	4-nitro-N ¹ -(2-piperidin-1-yl-ethyl)-benzene-1,3-diamine	265.1	1.45
1027	N ¹ -(1-benzyl-piperidin-4-yl)-4-nitro-benzene-1,3-diamine	294.5	1.71
1028	N ¹ -(1-ethyl-pyrrolidin-3-ylmethyl)-4-nitro-benzene-1,3-diamine	265.1	1.39
1029	N ¹ -[3-(4-methyl-piperazin-1-yl)-propyl]-4-nitro-benzene-1,3-diamine	294.5	1.38
1030	N ¹ -methyl-N ¹ -(1-methyl-piperidin-4-yl)-4-nitro-benzene-1,3-diamine	265.1	1.40
1031	N ¹ -(2-dimethylamino-ethyl)-N ¹ -methyl-4-nitro-benzene-1,3-diamine	239.2	1.48
1032	5-(9-isopropyl-1-oxa-4,9-diaza-spiro[5.5]undec-4-yl)-2-nitro-phenylamine	335.3	1.87
1033	5-(2-isopropyl-5-oxa-2,8-diaza-spiro[3.5]non-8-yl)-2-nitro-phenylamine	309.1	1.60

10 Preparation of Spirocycle Nitroanilines

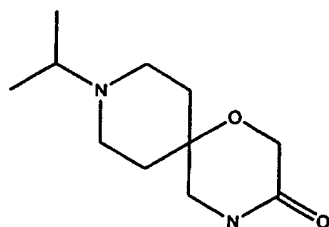
WO 03/004488

PCT/US02/20844

-338-

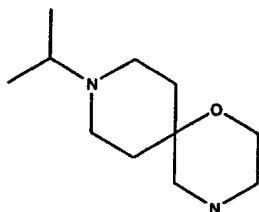
The spirocyclic nitroanilines of Examples 1032 and 1033 were synthesized according to the following procedure. The synthesis of Example 1033 is provided below. The synthesis of Example 1032 was carried out in an analogous manner starting from 5-oxa-2,8-diaza-spiro[3.5]nonan-7-one.

5 **Synthesis of 9-Isopropyl-1-oxa-4,9-diaza-spiro[5.5]undecan-3-one**



- 10 1-Oxa-4,9-diaza-spiro[5.5]undecan-3-one was dissolved in MeOH and treated with acetone (6 equivalents) and NaCNBH₃ (4 equivalents). To the reaction mixture was added acetic acid (3 equivalents). The reaction was heated at 50°C for 6 hours and then cooled to room temperature. The reaction was then poured into an aqueous NaHCO₃ solution and extracted with EtOAc (3x). The combined fractions were dried over MgSO₄ and concentrated to provide the title compound as a yellow oil that was purified by chromatography (10% MeOH/CH₂Cl₂). LC/MS (m/z) 213.1 (MH⁺), R_t = 1.38 minutes.

15 **Synthesis of 9-Isopropyl-1-oxa-4,9-diaza-spiro[5.5]undecane**



- 20 9-Isopropyl-1-oxa-4,9-diaza-spiro[5.5]undecan-3-one was dissolved in THF and LiAlH₄ (5 equivalents) was added. The reaction was heated at reflux for 4 hours and then cooled to room temperature. NaF (20 equivalents) and water (5 equivalents) were added and the reaction was stirred vigorously for 1 hour. The

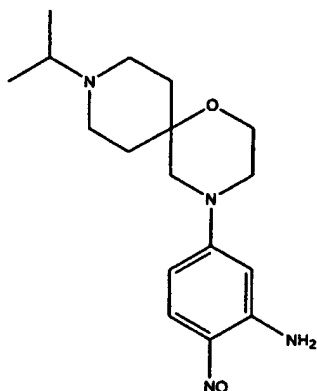
WO 03/004488

PCT/US02/20844

-339-

resulting precipitate was filtered away and the filtrate was concentrated to provide the title compound as a colorless oil. GC/MS (m/z) 198, R_t = 12.57 minutes.

Synthesis of 5-(9-Isopropyl-1-oxa-4,9-diaza-spiro[5.5]undec-4-yl)-2-nitro-phenylamine



The title compound was synthesized from 9-isopropyl-1-oxa-4,9-diaza-spiro[5.5]undecane using the procedure described above in Method 2.

Various indazole benzimidazoles are synthesized following the procedure of Example 4 using the nitroanilines of Examples 1024-1033 in combination with a indazole-3-carbaldehyde of formula XVI where R^1 , R^2 , R^3 , and R^4 have any of the values described above. For example, various indazole benzimidazoles are synthesized by reacting the nitroanilines of Examples 1024-1033 with 5-fluoroindazole, 5-chloroindazole, 6-fluoroindazole, 6-chloroindazole, 5-methoxyindazole, 6-methoxyindazole, 5-ethoxyindazole, and 6-ethoxyindazole 3-carbaldehydes.

Indazole benzimidazole compounds prepared from the nitroanilines of Examples 1024-1029 are reacted with an acyl halide such as acetyl chloride to provide benzimidazole indazoles with an amide group. In an acetylation procedure, a DMA solution of an indazole benzimidazole (1 equivalent) prepared from a nitroaniline of Examples 1024-1029 is added to a room temperature solution of acetyl chloride (1.5 equivalents) in THF over 15 minutes. After this time,

WO 03/004488

PCT/US02/20844

-340-

triethylamine (4 equivalents) is added dropwise and the reaction mixture is stirred for 2 hours at room temperature. The reaction is then partitioned between EtOAc and water. Aqueous layers are extracted with EtOAc (2x) and the combined extractions are washed with water once. Drying over anhydrous MgSO_4 and
5 concentration provides an oil that is purified by reverse phase HPLC to provide the desired product.

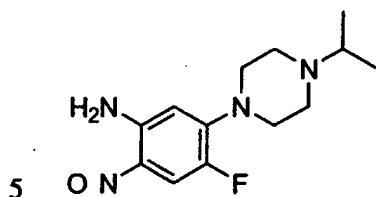
Indazole benzimidazole compounds prepared from the nitroanilines of Examples 1024-1029 are reacted with an acyl halide such as bromoacetyl chloride to provide benzimidazole indazoles with an amide group that includes a bromide for
10 further reaction. In such an acetylation procedure, a DMA solution of an indazole benzimidazole (1 equivalent) prepared from a nitroaniline of Examples 1024-1029 is added to a room temperature solution of bromoacetyl chloride (1.5 equivalents) in THF over 15 minutes. After this time, triethylamine (4 equivalents) is added dropwise and the reaction mixture is stirred for 2 hours at room temperature. The
15 reaction is then partitioned between EtOAc and water. Aqueous layers are extracted with EtOAc (2x) and the combined extractions are washed with water once. Drying over anhydrous MgSO_4 and concentration provides an oil that is purified by reverse phase HPLC to provide the desired product.

An indazole benzimidazole compound that has been reacted with a
20 bromoacetyl chloride such as described in the preceding paragraph is further functionalized by reaction with an amine. In such a reaction, the bromoacetylated product resulting from the reaction of the bromoacetyl chloride with an indazole benzimidazole prepared from the nitroanilines of Examples 1024-1029 is suspended in a desired amine such as, but not limited to, N-methylpiperazine, morpholine, and
25 piperidine and the reaction is heated at reflux for 1 hour. The reaction is concentrated and the residue is purified via reverse phase HPLC to provide the desired product in which the bromide has been displaced by the amine.

WO 03/004488

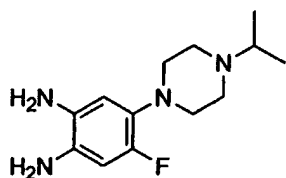
PCT/US02/20844

-341-

EXAMPLE 1034**5-Fluoro-3-[5-fluoro-6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole****Synthesis of 4-Fluoro-5-(4-isopropyl-piperazin-1-yl)-2-nitro-phenylamine**

4,5-Difluoro-2-nitrophenylamine (1.0 equivalent) and N-isopropyl piperazine were heated at 100°C for 3 hours. The solution was then cooled to room temperature and diluted with water. The resulting precipitate was filtered and dried under vacuum to provide title compound product. LC/MS (m/z) 283.2 (MH⁺), R_t 1.56 minutes.

10

Synthesis of 4-Fluoro-5-(4-isopropyl-piperazin-1-yl)-benzene-1,2-diamine

Reduction of 4-fluoro-5-(4-isopropyl-piperazin-1-yl)-2-nitro-phenylamine is carried out using the procedures described in Method 1 to afford the title product.

15

Synthesis of 5-Fluoro-3-[5-fluoro-6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

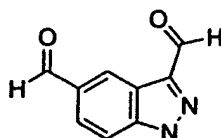
The title compound was synthesized as described in Example 4 from 4-fluoro-5-(4-isopropyl-piperazin-1-yl)-benzene-1,2-diamine and 5-fluoro-1H-indazole-3-carbaldehyde. LC/MS (m/z) 397.5 (MH⁺), R_t 2.78 minutes.

20

WO 03/004488

PCT/US02/20844

-342-

EXAMPLE 1035**3,5-Bis-(1H-benzoimidazol-2-yl)-1H-indazole****Synthesis of 1H-Indazole-3,5-dicarbaldehyde**

- 5 The title compound was synthesized as described in Example 4 from the commercially available 5-formylindole. LC/MS (m/z) 175.3 (MH⁺), R_t 1.80 min.

Synthesis of 3,5-Bis-(1H-benzoimidazol-2-yl)-1H-indazole

- The title compound was synthesized from 1H-Indazole-3,5-
10 dicarbaldehyde and 1,2-diaminobenzene using the methods described in Example 4 except that an excess of 1,2-diaminobenzene was used. LC/MS m/z 351.2 (MH⁺), R_t 2.03 minutes.

EXAMPLE 1036

- 5-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-
15 yl]-1H-indazole

Synthesis of 5-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

- The title compound was synthesized as described in Example 4 in three steps. First, 1H-indole-5-carbaldehyde is reacted with 1,2-diaminobenzene in
20 toluene and ethanol. The product of the first reaction is then reacted with NaNO₂ in dioxane with aqueous HCl. The 5-benzimidazole 3-carbaldehyde thus obtained is then reacted with 4-(4-methyl-piperazin-1-yl)-benzene-1,2-diamine to produce the title compound. LC/MS m/z 449.3 (MH⁺), R_t 1.71 minutes.

WO 03/004488

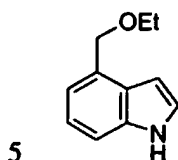
PCT/US02/20844

-343-

EXAMPLE 1037

**1'-[2-(4-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-
[1,4']bipiperidinyl**

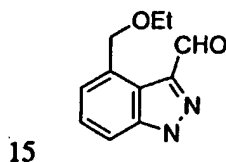
Synthesis of 4-Ethoxymethyl-1H-indole



Indole-4-methanol (1.0 equivalent) in THF is added to NaH (1.2 equivalents) in THF at 0°C. EtBr (5.0 equivalents) is added, and the resulting solution is warmed to room temperature and then heated at 50°C for 9 hours. The reaction mixture is quenched with H₂O, extracted with EtOAc. The organic layer is

10 dried over Na₂SO₄, filtered and concentrated. The organic layer is dried over Na₂SO₄, filtered, and concentrated. The product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the desired indole ether title compound.

Synthesis of 4-Ethoxymethyl-1H-indazole-3-carbaldehyde



The formation of 4-ethoxymethyl-1H-indazole-3-carbaldehyde from 4-ethoxymethyl-1H-indole is carried out as described in Example 4.

WO 03/004488

PCT/US02/20844

-344-

Synthesis of 1'-[2-(4-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI

The title compound is formed by reaction of 4-ethoxymethyl-1H-indazole-3-carbaldehyde with 4-[1,4']bipiperidinyI-1'-yl-benzene-1,2-diamine and is
5 carried out as described in Example 4.

EXAMPLES 1038-1046

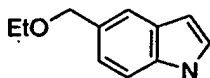
The following compounds are synthesized according to the procedure described above in Example 1037 using the appropriate starting materials.

Example	Name
1038	{4-[2-(4-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1039	{4-[2-(4-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1040	{4-[2-(4-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1041	4-methoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1042	4-benzyloxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1043	4-isopropoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1044	1'-[2-(4-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
1045	1'-[2-(4-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
1046	1'-[2-(4-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI

WO 03/004488

PCT/US02/20844

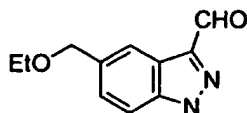
-345-

EXAMPLE 1047**1'-[2-(5-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-
[1,4']bipiperidiny]****Synthesis of 5-Ethoxymethyl-1H-indole**

5

Indole-5-methanol (1.0 equivalent) in THF is added to NaH (1.2 equivalents) in THF at 0°C. EtBr (5.0 equivalents) is added, and the resulting solution is warmed to room temperature and then heated at 50°C for 9 hours. The reaction mixture is then quenched with H₂O, extracted with EtOAc. The organic layer is dried over Na₂SO₄, filtered and concentrated. The product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the desired indole ether title compound.

10

Synthesis of 5-Ethoxymethyl-1H-indazole-3-carbaldehyde

15

The formation of 5-ethoxymethyl-1H-indazole-3-carbaldehyde from 5-ethoxymethyl-1H-indole is carried out as described in Example 4.

**Synthesis of 1'-[2-(5-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-
[1,4']bipiperidiny]**

The title compound is formed by reaction of 5-ethoxymethyl-1H-indazole-3-carbaldehyde with 4-[1,4']bipiperidiny-1'-yl-benzene-1,2-diamine and is carried out as described in Example 4.

20

WO 03/004488

PCT/US02/20844

-346-

EXAMPLES 1048-1056

The following compounds are synthesized according to the procedure described above in Example 1047 using the appropriate starting materials.

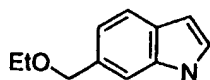
Example	Name
1048	{4-[2-(5-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1049	{4-[2-(5-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1050	{4-[2-(5-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1051	5-methoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1052	5-benzyloxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1053	5-isopropoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1054	1'-[2-(5-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
1055	1'-[2-(5-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
1056	1'-[2-(5-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI

5

EXAMPLE 1057

1'-[2-(6-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI

Synthesis of 6-Ethoxymethyl-1H-indole



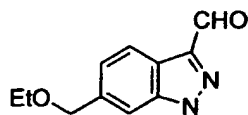
WO 03/004488

PCT/US02/20844

-347-

Indole-6-methanol (1.0 equivalent) in THF is added to NaH (1.2 equivalents) in THF at 0°C. EtBr (5.0 equivalents) is added, and the resulting solution is warmed to room temperature and then heated at 50°C for 9 hours. The reaction mixture is then quenched with H₂O, extracted with EtOAc. The organic layer is dried over Na₂SO₄, filtered and concentrated. The product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the desired indole ether title compound.

Synthesis of 6-Ethoxymethyl-1H-indazole-3-carbaldehyde



10 The formation of 6-ethoxymethyl-1H-indazole-3-carbaldehyde from 6-ethoxymethyl-1H-indole is carried out as described in Example 4.

Synthesis of 1'-[2-(6-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl

15 The title compound is formed by reaction of 6-ethoxymethyl-1H-indazole-3-carbaldehyde with 4-[1,4']bipiperidinyl-1'-yl-benzene-1,2-diamine and is carried out as described in Example 4.

EXAMPLES 1058-1066

The following compounds are synthesized according to the procedure described above in Example 1057 using the appropriate starting materials.

Example	Name
1058	{4-[2-(6-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1059	{4-[2-(6-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine

WO 03/004488

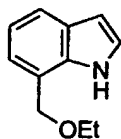
PCT/US02/20844

-348-

1060	{4-[2-(6-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1061	6-methoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1062	6-benzyloxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1063	6-isopropoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1064	1'-[2-(6-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]
1065	1'-[2-(6-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]
1066	1'-[2-(6-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]

EXAMPLE 1067

1'-[2-(7-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidiny]

5 Synthesis of 7-Ethoxymethyl-1H-indole

- Indole-7-methanol (1.0 equivalent) in THF is added to NaH (1.2 equivalents) in THF at 0°C. EtBr (5.0 equivalents) is added, and the resulting solution is warmed to room temperature and then heated at 50°C for 9 hours. The reaction mixture is then quenched with H₂O, extracted with EtOAc. The organic layer is dried over Na₂SO₄, filtered and concentrated. The product is purified by flash chromatography (MeOH:CH₂Cl₂, 5:95) to yield the desired indole ether title compound.

WO 03/004488

PCT/US02/20844

-349-

Synthesis of 7-Ethoxymethyl-1H-indazole-3-carbaldehyde

The formation of 7-ethoxymethyl-1H-indazole-3-carbaldehyde from 7-ethoxymethyl-1H-indole is carried out as described in Example 4.

5 Synthesis of 1'-[2-(7-Ethoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyl

The title compound is formed by reaction of 7-ethoxymethyl-1H-indazole-3-carbaldehyde with 4-[1,4']bipiperidinyl-1'-yl-benzene-1,2-diamine and is carried out as described in Example 4.

10

EXAMPLES 1068-1076

The following compounds are synthesized according to the procedure described above in Example 1067 using the appropriate starting materials.

Example	Name
1068	{4-[2-(7-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1069	{4-[2-(7-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1070	{4-[2-(7-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-5-methyl-morpholin-2-ylmethyl}-dimethyl-amine
1071	7-methoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1072	7-benzyloxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1073	7-isopropoxymethyl-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

WO 03/004488

PCT/US02/20844

-350-

1074	1'-[2-(7-methoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
1075	1'-[2-(7-benzyloxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI
1076	1'-[2-(7-isopropoxymethyl-1H-indazol-3-yl)-3H-benzoimidazol-5-yl]-[1,4']bipiperidinyI

EXAMPLE 1077**3-(1H-Benzoimidazol-2-yl)-1H-indazol-4-ol**

- A solution of 4-hydroxyindole (1.0 equivalent), benzyl chloroformate (1.1 equivalents), and diisopropylethylamine (2.0 equivalents) in CH₂Cl₂ is stirred for 18 hours. The solution is concentrated to yield the desired CBz protected indole ether. The product is then reacted with NaNO₂ in HCl and dioxane as described in Example 4, followed by reaction with phenylenediamine in EtOH and toluene using the methods described above to yield the Cbz protected indazole benzimidazole.
- 10 The Cbz-protected product is deprotected using 10% Pd/C and H₂ to provide the desired 4-hydroxyindole benzimidazole.

EXAMPLE 1078**3-(1H-Benzoimidazol-2-yl)-1H-indazol-6-ol**

- A solution of 6-hydroxyindole (1.0 equivalent), benzyl chloroformate (1.1 equivalents), and diisopropylethylamine (2.0 equivalents) in CH₂Cl₂ is stirred for 18 hours. The solution is concentrated to yield the desired CBz protected indole ether. The product is then reacted with NaNO₂ in HCl and dioxane as described in Example 4, followed by reaction with phenylenediamine in EtOH and toluene using the methods described above to yield the Cbz protected indazole benzimidazole.
- 20 The Cbz-protected product is deprotected using 10% Pd/C and H₂ to provide the desired 6-hydroxyindole benzimidazole.

WO 03/004488

PCT/US02/20844

-351-

EXAMPLE 1079**3-(1H-Benzoimidazol-2-yl)-1H-indazol-7-ol**

A solution of 7-hydroxyindole (1.0 equivalent), benzyl chloroformate (1.1 equivalents), and diisopropylethylamine (2.0 equivalents) in CH₂Cl₂ is stirred for 18 hours. The solution is concentrated to yield the desired CBz protected indole ether. The product is then reacted with NaNO₂ in HCl and dioxane as described in Example 4, followed by reaction with phenylenediamine in EtOH and toluene using the methods described above to yield the Cbz protected indazole benzimidazole. The Cbz-protected product is deprotected using 10% Pd/C and H₂ to provide the desired 7-hydroxyindole benzimidazole.

EXAMPLES 1080-1095

The following compounds are synthesized according to the procedures described above using the appropriate starting materials.

Example	Name
1080	3-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-ol
1081	3-[5-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-ol
1082	3-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-ol
1083	3-[5-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-4-ol
1084	3-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-ol
1085	3-[5-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-ol
1086	3-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-ol
1087	3-[5-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-ol

WO 03/004488

PCT/US02/20844

-352-

1088	3-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-ol
1089	3-[5-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-ol
1090	3-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-ol
1091	3-[5-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-6-ol
1092	3-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ol
1093	3-[5-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ol
1094	3-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ol
1095	3-[5-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-7-ol

EXAMPLE 1096

5-[5-(4-Methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

- 5 The synthesis of the title compound is carried out using 1H-indazole-3,5-dicarbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine and the methods described in Example 4 except that an excess of the 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine is used.

WO 03/004488

PCT/US02/20844

-353-

EXAMPLE 1097

5-(1H-Benzoimidazol-2-yl)-3-[6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

Synthesis of 5-(1H-Benzoimidazol-2-yl)-3-[6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

The synthesis of the title compound is carried out as described in Example 1036 from 4-(4-isopropyl-piperazin-1-yl)-benzene-1,2-diamine to produce the title compound.

EXAMPLES 1098-1106

10 The following compounds are synthesized according to the procedures described above using the appropriate starting materials.

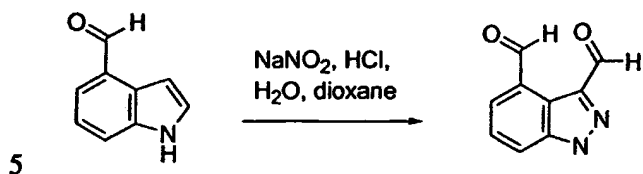
Example	Name
1098	[4-(2-{3-[6-(2-dimethylaminomethyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazol-5-yl}-1H-benzoimidazol-5-yl)-5-methyl-morpholin-2-ylmethyl]-dimethyl-amine
1099	5-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-3-[6-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1100	3-(1H-benzoimidazol-2-yl)-5-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1101	5-[5-(4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-3-[6-(4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1102	(4-{2-[5-(1H-benzoimidazol-2-yl)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
1103	3-(1H-benzoimidazol-2-yl)-5-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1104	5-(1H-benzoimidazol-2-yl)-3-[6-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1105	5-(1H-benzoimidazol-2-yl)-3-[6-(4-isopropyl-2-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

WO 03/004488

PCT/US02/20844

-354-

1106	(4-{2-[3-(1H-benzoimidazol-2-yl)-1H-indazol-5-yl]-1H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
------	--

EXAMPLE 1107**3,4-Bis-(1H-benzoimidazol-2-yl)-1H-indazole****Synthesis of 1H-Indazole-3,4-dicarbaldehyde**

The commercially available 1H-indole-4-carbaldehyde is reacted with NaNO_2 in the presence of HCl and H_2O in dioxane to produce the title compound.

Synthesis of 3,4-Bis-(1H-benzoimidazol-2-yl)-1H-indazole

- The title compound is prepared using the procedure described in
- 10 Example 4 from 1H-indazole-3,4-dicarbaldehyde and an excess of 1,2-diaminobenzene.

EXAMPLE 1108**4-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole**

- 15 **Synthesis of 4-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole**

The synthesis of the title compound is carried out as described in 1036 from 4-benzimidazole-3-indazole carbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine to produce the title compound.

WO 03/004488

PCT/US02/20844

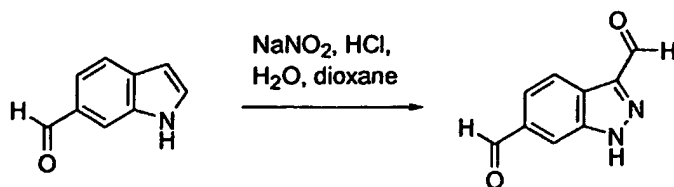
-355-

EXAMPLES 1109-1115

The following compounds are synthesized according to the procedures described above in Example 1108 using the appropriate starting materials.

Example	Name
1109	4-(1H-benzoimidazol-2-yl)-3-[6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1110	4-(1H-benzoimidazol-2-yl)-3-[6-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1111	(4-{2-[4-(1H-benzoimidazol-2-yl)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
1112	3-(1H-benzoimidazol-2-yl)-4-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1113	3-(1H-benzoimidazol-2-yl)-4-[6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1114	3-(1H-benzoimidazol-2-yl)-4-[6-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1115	(4-{2-[3-(1H-benzoimidazol-2-yl)-1H-indazol-4-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine

5

EXAMPLE 1116**3,6-Bis-(1H-benzoimidazol-2-yl)-1H-indazole****Synthesis of 1H-Indazole-3,6-dicarbaldehyde**

WO 03/004488

PCT/US02/20844

-356-

The synthesis of the title compound is carried out from 1H-indole-6-carbaldehyde by reacting it with NaNO₂ in dioxane with aqueous HCl using the method described in Example 4.

Synthesis of 3,6-Bis-(1H-benzoimidazol-2-yl)-1H-indazole

- 5 The synthesis of the title compound is carried out from 1H-Indazole-3,6-dicarbaldehyde by reacting it with an excess of 1,2-diaminobenzene using the method described in Example 4.

EXAMPLE 1117

- 10 **6-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole**

Synthesis of 6-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

- 15 The synthesis of the title compound is carried out as described in 1036 from 6-benzimidazole-3-indazole carbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine to produce the title compound.

EXAMPLES 1118-1124

The following compounds are synthesized according to the procedures described above in Example 1108 using the appropriate starting materials.

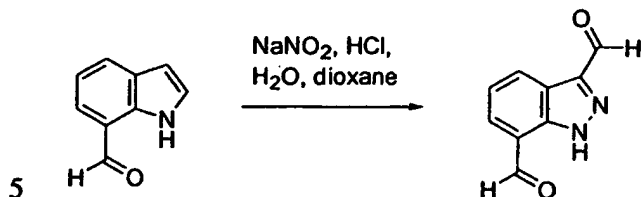
Example	Name
1118	6-(1H-benzoimidazol-2-yl)-3-[6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1119	6-(1H-benzoimidazol-2-yl)-3-[6-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1120	(4-{2-[6-(1H-benzoimidazol-2-yl)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine

WO 03/004488

PCT/US02/20844

-357-

1121	3-(1H-benzoimidazol-2-yl)-6-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1122	3-(1H-benzoimidazol-2-yl)-6-[5-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1123	3-(1H-benzoimidazol-2-yl)-6-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1124	3-(1H-benzoimidazol-2-yl)-6-[5-(2-isobutyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole

EXAMPLE 1125**3,7-Bis-(1H-benzoimidazol-2-yl)-1H-indazole****Synthesis of 1H-Indazole-3,7-dicarbaldehyde**

The synthesis of the title compound is carried out from 1H-indole-7-carbaldehyde by reacting it with NaNO_2 in dioxane with aqueous HCl using the method described in Example 4.

Synthesis of 3,7-Bis-(1H-benzoimidazol-2-yl)-1H-indazole

10 The synthesis of the title compound is carried out from 1H-indazole-3,7-dicarbaldehyde by reacting it with an excess of 1,2-diaminobenzene using the method described in Example 4.

WO 03/004488

PCT/US02/20844

-358-

EXAMPLE 1126

7-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

Synthesis of 7-(1H-Benzoimidazol-2-yl)-3-[6-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole

The synthesis of the title compound is carried out as described 1036 from 7-benzimidazole-3 indazolecarbaldehyde and 4-(4-methylpiperazin-1-yl)-benzene-1,2-diamine to produce the title compound.

EXAMPLES 1127-1133

10 The following compounds are synthesized according to the procedures described above in Example 1108 using the appropriate starting materials.

Example	Name
1127	7-(1H-benzoimidazol-2-yl)-3-[6-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1128	7-(1H-benzoimidazol-2-yl)-3-[6-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1129	(4-{2-[7-(1H-benzoimidazol-2-yl)-1H-indazol-3-yl]-3H-benzoimidazol-5-yl}-5-methyl-morpholin-2-ylmethyl)-dimethyl-amine
1130	3-(1H-benzoimidazol-2-yl)-7-[5-(4-methyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1131	3-(1H-benzoimidazol-2-yl)-7-[5-(4-isopropyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1132	3-(1H-benzoimidazol-2-yl)-7-[5-(2,4-dimethyl-piperazin-1-yl)-1H-benzoimidazol-2-yl]-1H-indazole
1133	3-(1H-benzoimidazol-2-yl)-7-[5-(2-isobutyl-5-methyl-morpholin-4-yl)-1H-benzoimidazol-2-yl]-1H-indazole

WO 03/004488

PCT/US02/20844

-359-

EXAMPLES 1134-1160

Examples 1134-1160 were using the procedure set forth above in Example 732 for the synthesis of indazole benzimidazoles.

Example	Name	LC/MS m/z (MH+)
1134	4-{{2-(5-fluoro-1H-indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	417.4
1135	4-{{2-(5-methoxy-1H-indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	429.4
1136	Methyl 3-[1-methyl-5-({2-[(methylamino)carbonyl]pyridin-4-yl}oxy)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	457.5
1137	N-methyl-4-{{1-methyl-2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-5-yl}oxy}pyridine-2-carboxamide	413.5
1138	4-({2-[5-(benzyloxy)-1H-indazol-3-yl]-1-methyl-1H-benzimidazol-5-yl}oxy)-N-methylpyridine-2-carboxamide	505.5
1139	4-{{2-(6-fluoro-1H-indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	417.4
1140	4-{{2-(6-chloro-1H-indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	433.9
1141	4-{{2-(5,6-difluoro-1H-indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	435.4
1142	4-{{2-(6-chloro-5-fluoro-1H-indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	451.9
1143	4-{{2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-1-methyl-1H-benzimidazol-5-yl}oxy}-N-methylpyridine-2-carboxamide	443.4
1144	4-{{2-(5-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	419.8
1145	4-{{2-(5-bromo-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	464.3
1146	Methyl 3-[6-({2-[(methylamino)carbonyl]pyridin-4-yl}oxy)-1H-benzimidazol-2-yl]-1H-indazole-5-carboxylate	443.4

WO 03/004488

PCT/US02/20844

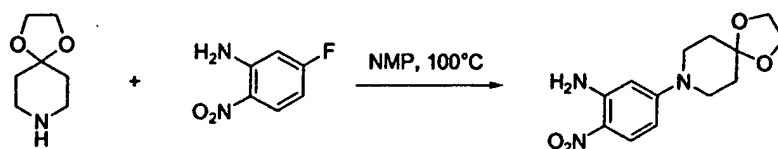
-360-

1147	N-methyl-4-{{2-(5-methyl-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}pyridine-2-carboxamide	399.4
1148	4-{{2-[5-(benzyloxy)-1H-indazol-3-yl]-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	491.5
1149	4-{{2-(6-fluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	403.4
1150	4-{{2-(5,6-difluoro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	421.4
1151	4-{{2-(1H-[1,3]dioxolo[4,5-f]indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	429.4
1152	4-{{2-(7-chloro-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	419.8
1153	4-{{2-(6-cyano-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	410.4
1154	4-{{2-(5-isobutoxy-1H-indazol-3-yl)-1H-benzimidazol-6-yl}oxy}-N-methylpyridine-2-carboxamide	457.5
1155	5-fluoro-3-[5-fluoro-6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	397.4
1156	3-[5-fluoro-6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-5-methyl-1H-indazole	393.5
1157	5-(benzyloxy)-3-[5-fluoro-6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	485.6
1158	6-fluoro-3-[5-fluoro-6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	397.4
1159	6-chloro-3-[5-fluoro-6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-indazole	413.9
1160	3-[5-fluoro-6-(4-isopropylpiperazin-1-yl)-1H-benzimidazol-2-yl]-1H-[1,3]dioxolo[4,5-f]indazole	423.5

WO 03/004488

PCT/US02/20844

-361-

EXAMPLE 1161**8-[2-(1H-Indazol-3-yl)-1H-benzoimidazol-5-yl]-1,4-dioxo-8-aza-spiro[4.5]decane****Synthesis of 5-(1,4-Dioxo-8-aza-spiro[4.5]dec-8-yl)-2-nitro-phenylamine**

- 5 The title compound was synthesized as described in Method 10, Step 2 from 1,4-dioxo-8-aza-spiro[4.5]decane and 5-fluoro-2-nitrophenylamine. LC/MS (m/z) 280.3 (MH⁺), R_t 2.41 minutes.

Synthesis of 8-[2-(1H-Indazol-3-yl)-1H-benzoimidazol-5-yl]-1,4-dioxo-8-aza-spiro[4.5]decane

- 10 5-(1,4-Dioxo-8-aza-spiro[4.5]dec-8-yl)-2-nitro-phenylamine was reduced to produce 4-(1,4-dioxo-8-aza-spiro[4.5]dec-8-yl)-benzene-1,2-diamine using the procedures described above. The reduced 1,2-diaminobenzene product is heated in toluene and EtOH at 100°C overnight with indazole-3-carbaldehyde (1.0 equivalent) to give the title compound.

15 **EXAMPLE 1162**

{1-[2-(1H-Indazol-3-yl)-1H-benzoimidazol-5-yl]-piperidin-4-yl}-dimethyl-amine**Synthesis of {1-[2-(1H-Indazol-3-yl)-1H-benzoimidazol-5-yl]-piperidin-4-yl}-dimethyl-amine**

- 20 The dioxolane protecting group of 8-[2-(1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-1,4-dioxo-8-aza-spiro[4.5]decane is removed with PPTS (1.15 equivalents) in acetone in the microwave (~300 watts, 150 °C, 11 minutes) to give the ketone. The ketone is reacted with dimethylamine and BH₃:pyridine (10

WO 03/004488

PCT/US02/20844

-362-

equivalents) in AcOH:MeOH:CH₂Cl₂ as described in Example 710 to yield the title compound.

EXAMPLES 1163-1199

- The following compounds are synthesized according to the procedures described in Examples 1161 and 1162 using the appropriate starting materials.

Example	Name
1163	{1-[2-(5-chloro(1H-indazol-3-yl))benzimidazol-5-yl](4-piperidyl)}dimethylamine
1164	{1-[2-(5-fluoro(1H-indazol-3-yl))benzimidazol-5-yl](4-piperidyl)}dimethylamine
1165	{1-[2-(5-methoxy(1H-indazol-3-yl))benzimidazol-5-yl](4-piperidyl)}dimethylamine
1166	5-chloro-3-[5-(4-pyrrolidinylpiperidyl)benzimidazol-2-yl]-1H-indazole
1167	5-fluoro-3-[5-(4-pyrrolidinylpiperidyl)benzimidazol-2-yl]-1H-indazole
1168	5-methoxy-3-[5-(4-pyrrolidinylpiperidyl)benzimidazol-2-yl]-1H-indazole
1169	{1-[2-(6-chloro(1H-indazol-3-yl))benzimidazol-5-yl](4-piperidyl)}dimethylamine
1170	{1-[2-(6-fluoro(1H-indazol-3-yl))benzimidazol-5-yl](4-piperidyl)}dimethylamine
1171	{1-[2-(6-methoxy(1H-indazol-3-yl))benzimidazol-5-yl](4-piperidyl)}dimethylamine
1172	6-chloro-3-[5-(4-pyrrolidinylpiperidyl)benzimidazol-2-yl]-1H-indazole
1173	6-fluoro-3-[5-(4-pyrrolidinylpiperidyl)benzimidazol-2-yl]-1H-indazole
1174	6-methoxy-3-[5-(4-pyrrolidinylpiperidyl)benzimidazol-2-yl]-1H-indazole
1175	5-chloro-3-{5-[4-(4-methylpiperazinyl)piperidyl]benzimidazol-2-yl}-1H-indazole

WO 03/004488

PCT/US02/20844

-363-

1176	5-fluoro-3-{5-[4-(4-methylpiperazinyl)piperidyl]benzimidazol-2-yl}-1H-indazole
1177	5-methoxy-3-{5-[4-(4-methylpiperazinyl)piperidyl]benzimidazol-2-yl}-1H-indazole
1178	4-{1-[2-(5-chloro-1H-indazol-3-yl)benzimidazol-5-yl]-4-piperidyl}morpholine
1179	4-{1-[2-(5-fluoro-1H-indazol-3-yl)benzimidazol-5-yl]-4-piperidyl}morpholine
1180	5-methoxy-3-[5-(4-morpholin-4-ylpiperidyl)benzimidazol-2-yl]-1H-indazole
1181	6-chloro-3-{5-[4-(4-methylpiperazinyl)piperidyl]benzimidazol-2-yl}-1H-indazole
1182	6-fluoro-3-{5-[4-(4-methylpiperazinyl)piperidyl]benzimidazol-2-yl}-1H-indazole
1183	6-methoxy-3-{5-[4-(4-methylpiperazinyl)piperidyl]benzimidazol-2-yl}-1H-indazole
1184	4-{1-[2-(6-chloro-1H-indazol-3-yl)benzimidazol-5-yl]-4-piperidyl}morpholine
1185	4-{1-[2-(6-fluoro-1H-indazol-3-yl)benzimidazol-5-yl]-4-piperidyl}morpholine
1186	6-methoxy-3-[5-(4-morpholin-4-ylpiperidyl)benzimidazol-2-yl]-1H-indazole
1187	{1'-[2-(1H-Indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidinyl-4-yl}-dimethyl-amine
1188	{1'-[2-(5-chloro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidinyl-4-yl}-dimethyl-amine
1189	{1'-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidinyl-4-yl}-dimethyl-amine
1190	{1'-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidinyl-4-yl}-dimethyl-amine
1191	1'-[2-(5-chloro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-4-pyrrolidin-1-yl-[1,4']bipiperidinyl
1192	1'-[2-(5-fluoro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-4-pyrrolidin-1-yl-[1,4']bipiperidinyl

WO 03/004488

PCT/US02/20844

-364-

1193	1'-[2-(5-methoxy-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-4-pyrrolidin-1-yl-[1,4']bipiperidiny1
1194	{1'-[2-(6-chloro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidiny1-4-yl}-dimethyl-amine
1195	{1'-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidiny1-4-yl}-dimethyl-amine
1196	{1'-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-[1,4']bipiperidiny1-4-yl}-dimethyl-amine
1197	1'-[2-(6-chloro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-4-pyrrolidin-1-yl-[1,4']bipiperidiny1
1198	1'-[2-(6-fluoro-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-4-pyrrolidin-1-yl-[1,4']bipiperidiny1
1199	1'-[2-(6-methoxy-1H-indazol-3-yl)-1H-benzoimidazol-5-yl]-4-pyrrolidin-1-yl-[1,4']bipiperidiny1

ASSAY PROCEDURES

In vitro kinase assays for receptor tyrosine kinases

- The kinase activity of various protein tyrosine kinases can be measured by providing ATP and a suitable peptide or protein tyrosine-containing substrate, and assaying the transfer of phosphate moiety to the tyrosine residue. Recombinant proteins corresponding to the cytoplasmic domains of the flt-1 (VEGFR1), Flk-1, Tie-2, PDGF, and bFGF receptors were expressed in Sf9 insect cells using a Baculovirus expression system (InVitrogen) and purified via Glu antibody interaction (for Glu-epitope tagged constructs) or by Metal Ion Chromatography (for His₆ tagged constructs). For each assay, test compounds were serially diluted in DMSO then mixed with an appropriate kinase reaction buffer plus ATP. Kinase protein and an appropriate biotinylated peptide substrate were added to give a final volume of 50-100 μ L, reactions were incubated for 1-3 hours at room temperature and stopped by the addition of 25-50 μ L of 45mM EDTA, 50mM Hepes pH 7.5. Stopped reaction mix (75 μ L) was transferred to a streptavidin coated microtiter plate (Boehringer Mannheim) and incubated for 1 hour.

WO 03/004488

PCT/US02/20844

-365-

Phosphorylated peptide product was measured with the DELFIA time-resolved fluorescence system (Wallac or PE Biosciences), using a Eu-labeled anti-phosphotyrosine antibody PT66 with the modification that the DELFIA assay buffer was supplemented with 1 mM MgCl₂ for the antibody dilution. Time resolved
5 fluorescence was read on a Wallac 1232 DELFIA fluorometer or a PE Victor II multiple signal reader. The concentration of each compound for 50% inhibition (IC₅₀) was calculated by non-linear regression using XL Fit data analysis software.

Flt-1, Flk-1, Tie-2, and bFGFR kinases were assayed in 50 mM Hepes pH 7.0, 2 mM MgCl₂, 10 mM MnCl₂, 1 mM NaF, 1 mM DTT, 1 mg/ml
10 BSA, 2 μM ATP, and 0.20-0.50 μM corresponding biotinylated peptide substrate. Flt-1, Flk-1, Tie-2, and bFGFR kinases were added at 0.1 μg/mL, 0.05 μg/mL, or 0.1 μg/mL respectively. For the PDGFR kinase assay, 120 μg/mL enzyme with the same buffer conditions as above was used except for changing ATP and peptide
15 substrate concentrations to 1.4 μM ATP, and 0.25 μM biotin-GGLFDDPSYVNVQNL-NH₂ peptide substrate.

In vitro kinase assays for serine/threonine kinases

The kinase activity of various protein serine/threonine kinases can be measured by providing ATP and a suitable peptide or protein serine/threonine containing substrate, and assaying the transfer of phosphate moiety to the serine or
20 threonine residue. Recombinant proteins containing the kinase domains of GSK-3, NEK-2, and CHK 1 enzymes were expressed in Sf9 insect cells using a Baculovirus expression system (InVitrogen) and purified via Glu antibody interaction (for Glu-epitope tagged constructs) or by Metal Ion Chromatography (for His₆ tagged constructs). The purified cdc 2 enzyme used in the assay is commercially available
25 and was purchased from New England Bio Labs. For each assay, test compounds were serially diluted in DMSO then mixed with an appropriate kinase reaction buffer plus ³²P γ-labeled ATP. Kinase protein and an appropriate biotinylated peptide substrate were added to give a final volume of 100 μL. Reactions were incubated for 1-2 hours at room temperature and stopped by the addition of 50 μL

WO 03/004488

PCT/US02/20844

-366-

of a solution of 45 mM EDTA, 50 mM Hepes pH 7.5, 50 μ L unlabelled ATP. Stopped reaction mix (75 μ L) was transferred to a streptavidin coated microtiter plate (Boehringer Mannheim) and incubated for 1 hour. Streptavidin plates were washed with PBS, diluted with 200 μ L Microscint 20 scintillation fluid, sealed, and
5 counted using TopCount. The concentration of each compound for 50% inhibition (IC_{50}) was calculated by non-linear regression using XL Fit data analysis software.

Each of the compounds produced in Examples 1-728 was synthesized and assayed using the procedures described above. The majority of the exemplary compounds displayed an IC_{50} value of less than 10 μ M with respect to VEGFR1,
10 Flk-1, bFGF, Tie-2, CHK-1, cdc2, GSK-3, NEK-2, and PDGF. In addition, many of the exemplary compounds exhibited IC_{50} values in the nM range and showed potent activity with respect to VEGFR1, Flk-1, bFGF, Tie-2, CHK-1, cdc2, GSK-3, NEK-2, and PDGF with IC_{50} values of less than 1 μ M. The other examples also exhibited such activity with respect to VEGFR1, Flk-1, bFGF, Tie-2, CHK-1, cdc2,
15 GSK-3, NEK-2, and PDGF or will be shown to exhibit such activity. The exemplary compounds also exhibit inhibition activity with respect to KDR.

Each of Examples 1-728 and many of the other examples exhibited activity in one or more important assays. Many of the other exemplary compounds will be shown to exhibit activity in these assays. For this reason, each of the
20 Exemplary compounds is both individually preferred and is preferred as a group. One, two, or more compounds of the invention may be used in combination in pharmaceutical formulations, medicaments, and in methods of treating subjects. Furthermore, each of the R^1 - R^{10} groups of the exemplary compounds is preferred individually and as a member of a group.

25 In one embodiment, the invention provides a method of inhibiting flt-1 (VEGFR1). The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

WO 03/004488

PCT/US02/20844

-367-

In one embodiment, the invention provides a method of inhibiting KDR (VEGFR2). The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting Flk-1. The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting bFGFR. The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting GSK-3. The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting NEK-2. The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting CHK-1. The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first,

WO 03/004488

PCT/US02/20844

-368-

second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting cdc

2. The method includes administering an effective amount of a compound, or a
5 pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting

- Tie-2. The method includes administering an effective amount of a compound, or a
10 pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting

- PDGF. The method includes administering an effective amount of a compound, or
15 a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting

- bFGF. The method includes administering an effective amount of a compound, or a
20 pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

In one embodiment, the invention provides a method of inhibiting a

- serine/threonine kinase. The method includes administering an effective amount of
25 a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds of formula I to a subject, such as a human, in need thereof.

WO 03/004488

PCT/US02/20844

-369-

In one embodiment, the invention provides a method of inhibiting a tyrosine kinase. The method includes administering an effective amount of a compound, or a pharmaceutically acceptable salt thereof, of any of the embodiments of the first, second, third, fourth, fifth, sixth, and/or seventh groups of compounds
5 of formula I to a subject, such as a human, in need thereof.

It should be understood that the organic compounds according to the invention may exhibit the phenomenon of tautomerism. As the chemical structures within this specification can only represent one of the possible tautomeric forms, it should be understood that the invention encompasses any tautomeric form of the
10 drawn structure.

It is understood that the invention is not limited to the embodiments set forth herein for illustration, but embraces all such forms thereof as come within the scope of the following claims.

WO 03/004488

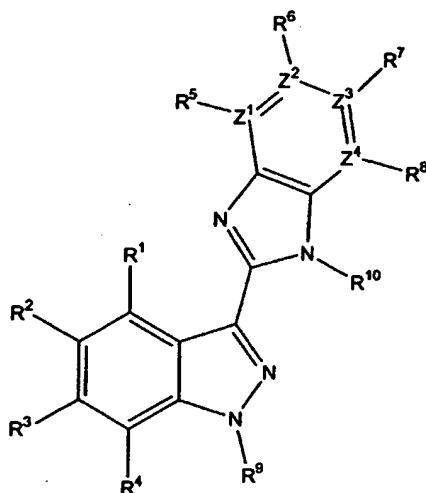
PCT/US02/20844

-370-

CLAIMS

What is claimed is:

- 1 1. A compound having the structure I, a tautomer of the
2 compound, a pharmaceutically acceptable salt of the compound, or a
3 pharmaceutically acceptable salt of the tautomer



I

4
5 wherein

6 Z¹, Z², Z³, and Z⁴ are independently selected from C or N;

7 R¹ is selected from the group consisting of -H, -F, -Cl, and -Br;

8 R² is selected from the group consisting of -H, -F, -Cl, -Br, -C≡N,
9 -NO₂, -CO₂H, substituted and unsubstituted amino groups, substituted and
10 unsubstituted alkyl groups, substituted and unsubstituted -C(=O)O-alkyl groups,
11 substituted and unsubstituted -C(=O)O-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-371-

12 -C(=O)O-heteroaryl groups, substituted and unsubstituted -C(=O)N(H)-alkyl
13 groups, substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and
14 unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
15 -N(H)C(=O)-alkyl groups, substituted and unsubstituted -N(H)C(=O)-aryl groups,
16 substituted and unsubstituted -N(H)C(=O)-heterocyclyl groups, substituted and
17 unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
18 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted -N(H)-heterocyclyl
19 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
20 arylalkoxy groups, and substituted and unsubstituted heterocyclylalkoxy groups;

21 R^3 is selected from the group consisting of -H, -F, -Cl, -Br, and
22 substituted and unsubstituted alkoxy groups;

23 R^4 is -H;

24 R^5 is selected from the group consisting of -H, -F, -Cl, substituted
25 and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups,
26 substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino
27 groups, substituted and unsubstituted dialkylamino groups, and substituted and
28 unsubstituted heterocyclyl groups, or R^5 is absent if Z^1 is N;

29 R^6 is selected from the group consisting of -H, -F, -Cl, -Br, -CF₃,
30 -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted
31 alkoxy groups including substituted and unsubstituted heterocyclylalkoxy groups,
32 substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted
33 alkoxyalkoxy groups; substituted and unsubstituted heterocyclyl groups including
34 substituted and unsubstituted heterocyclylheterocyclyl groups, substituted and
35 unsubstituted arylheterocyclyl groups, and substituted and unsubstituted
36 cycloalkylheterocyclyl groups; substituted and unsubstituted heterocycliloxy groups,
37 substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino

WO 03/004488

PCT/US02/20844

-372-

38 groups including substituted and unsubstituted dialkylamino groups, substituted and
39 unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted
40 heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups,
41 and substituted and unsubstituted heterocyclamino groups; substituted and
42 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
43 -C(=O)N(H)-aryl groups, and substituted and unsubstituted
44 -C(=O)N(H)-heterocycl groups; or R⁶ is absent if Z² is N;

45 R⁷ is selected from the group consisting of -H, -F, -Cl, -Br, -CF₃,
46 -CO₂H, substituted and unsubstituted alkyl groups, substituted and unsubstituted
47 alkoxy groups including substituted and unsubstituted heterocyclalkoxy groups,
48 substituted and unsubstituted arylalkoxy groups, and substituted and unsubstituted
49 alkoxyalkoxy groups; substituted and unsubstituted heterocycl groups including
50 substituted and unsubstituted heterocyclheterocycl groups, substituted and
51 unsubstituted arylheterocycl groups, and substituted and unsubstituted
52 cycloalkylheterocycl groups; substituted and unsubstituted heterocyclloxy groups,
53 substituted and unsubstituted aryloxy groups, substituted and unsubstituted amino
54 groups including substituted and unsubstituted dialkylamino groups, substituted and
55 unsubstituted (alkyl)(heterocycl)amino groups, and substituted and unsubstituted
56 heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups,
57 substituted and unsubstituted heterocyclamino groups; substituted and
58 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
59 -C(=O)N(H)-aryl groups, and substituted and unsubstituted
60 -C(=O)N(H)-heterocycl groups; or R⁷ is absent if Z³ is N;

61 R⁸ is selected from the group consisting of -H, -F, -Cl, substituted
62 and unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups,
63 substituted and unsubstituted amino groups, substituted and unsubstituted alkylamino
64 groups, substituted and unsubstituted dialkylamino groups, and substituted and
65 unsubstituted heterocycl groups, or R⁸ is absent if Z⁴ is N;

WO 03/004488

PCT/US02/20844

-373-

66 R⁹ is -H; and

67 R¹⁰ is -H,

68 and further wherein at least one of R¹, R², R³, R⁵, R⁶, R⁷ or R⁸ is not
69 -H.

1 2. The compound of claim 1, wherein Z¹, Z², Z³, and Z⁴ are C.

1 3. The compound of claim 1, wherein R¹ is selected from -H, -F,
2 -Cl, or -Br.

1 4. The compound of claim 1, wherein R³ is selected from the
2 group consisting of -F, -Cl, -Br, and substituted and unsubstituted alkoxy groups.

1 5. The compound of claim 1, wherein R² is selected from the
2 group consisting of -H, -F, -Cl, -CO₂H, substituted and unsubstituted alkyl groups,
3 substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted
4 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
5 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
6 unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted
7 -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl
8 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
9 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
10 -N(H)-heterocyclyl groups, substituted and unsubstituted alkoxy groups, substituted
11 and unsubstituted arylalkoxy groups, and substituted and unsubstituted
12 heterocyclylalkoxy groups.

1 6. The compound of claim 1, wherein R² is H.

WO 03/004488

PCT/US02/20844

-374-

1 7. The compound of claim 1, wherein R² is an unsubstituted
2 alkoxy group having from 1 to 4 carbon atoms, a substituted or unsubstituted alkyl
3 group, or a substituted or unsubstituted arylalkoxy group..

1 8. The compound of claim 1, wherein R³ is selected from the
2 group consisting of -H, -F, -Cl, and -OMe.

1 9. The compound of claim 1, wherein R⁵ or R⁸ is selected from
2 -H, a -CH₃ group, or a morpholine group.

1 10. The compound of claim 1, wherein R⁶ is selected from the
2 group consisting of -Br, substituted and unsubstituted alkyl groups, substituted and
3 unsubstituted alkoxy groups including substituted and unsubstituted
4 heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
5 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
6 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
7 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
8 unsubstituted heterocyclyl groups including substituted and unsubstituted
9 heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl
10 groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted
11 and unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy
12 groups, and substituted and unsubstituted amino groups including substituted and
13 unsubstituted dialkylamino groups, substituted and unsubstituted
14 (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted
15 heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups,
16 and substituted and unsubstituted heterocyclylamino groups.

1 11. The compound of claim 1, wherein R⁶ is an alkoxy group
2 having from 1-6 carbon atoms or an alkyl group having from 1-6 carbon atoms.

WO 03/004488

PCT/US02/20844

-375-

1 12. The compound of claim 1, wherein R^6 is a substituted alkoxy
2 group having the formula $-OCH_2(CH_2)_mR^{11}$ where m is an integer selected from the
3 group consisting of 0, 1, and 2 and R^{11} is selected from the group consisting of
4 substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl
5 groups, and substituted and unsubstituted heterocyclyl groups.

1 13. The compound of claim 1, wherein R^6 is a substituted amino
2 group having the formula $-N(R^{12})CH_2(CH_2)_mR^{13}$ where m is an integer selected from
3 0, 1, or 2, R^{13} is selected from the group consisting of substituted and unsubstituted
4 alkoxy groups, substituted and unsubstituted aryl groups, and substituted and
5 unsubstituted heterocyclyl groups, and R^{12} is selected from the group consisting of
6 -H, and substituted and unsubstituted alkyl groups.

1 14. The compound of claim 1, wherein R^6 is a substituted or
2 unsubstituted heterocyclyl group.

1 15. The compound of claim 1, wherein at least one of R^6 or R^7 is
2 -H.

1 16. The compound of claim 1, wherein R^7 is selected from the
2 group consisting of substituted and unsubstituted alkyl groups, substituted and
3 unsubstituted alkoxy groups including substituted and unsubstituted
4 heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
5 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
6 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
7 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
8 unsubstituted heterocyclyl groups including substituted and unsubstituted
9 heterocyclylheterocyclyl groups, substituted and unsubstituted arylheterocyclyl
10 groups, and substituted and unsubstituted cycloalkylheterocyclyl groups; substituted

WO 03/004488

PCT/US02/20844

-376-

11 and unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy
12 groups, and substituted and unsubstituted amino groups including substituted and
13 unsubstituted dialkylamino groups, substituted and unsubstituted
14 (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted
15 heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups,
16 and substituted and unsubstituted heterocyclylamino groups.

1 17. The compound of claim 1, wherein R^7 is an alkoxy group
2 having from 1-6 carbon atoms or an alkyl group having from 1-6 carbon atoms.

1 18. The compound of claim 1, wherein R^7 is selected from the
2 group consisting of a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$
3 where n is an integer selected from 0, 1, or 2 and R^{14} is selected from substituted
4 and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and
5 substituted and unsubstituted heterocyclyl groups.

1 19. The compound of claim 1, wherein R^7 is a substituted amino
2 group having the formula $-N(R^{15})CH_2(CH_2)_nR^{16}$ where n is an integer selected from
3 0, 1, or 2, R^{16} is selected from the group consisting of substituted and unsubstituted
4 alkoxy groups, substituted and unsubstituted aryl groups, and substituted and
5 unsubstituted heterocyclyl groups, and R^{15} is selected from the group consisting of
6 -H, and substituted and unsubstituted alkyl groups.

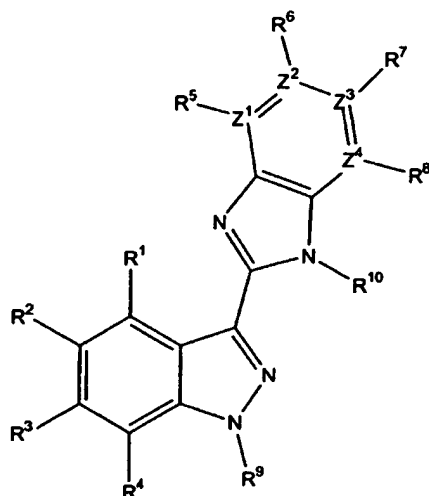
1 20. The compound of claim 1, wherein R^7 is a substituted or
2 unsubstituted heterocyclyl group.

WO 03/004488

PCT/US02/20844

-377-

- 1 21. A compound having the structure I, a tautomer of the
 2 compound, a pharmaceutically acceptable salt of the compound, or a
 3 pharmaceutically acceptable salt of the tautomer



I

4
 5 wherein

6 Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

7 R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
 8 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and
 9 unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
 10 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
 11 unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
 12 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
 13 unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl
 14 groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
 15 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
 16 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
 17 groups, substituted and unsubstituted amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-378-

- 18 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
19 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
20 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
21 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
22 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
23 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
24 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
26 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
27 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
29 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
30 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
31 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
32 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
33 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
34 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
35 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
36 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
37 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
38 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 39 R^2 is selected from -H, -F, -Cl, -Br, -C \equiv N, -NO $_2$, -CO $_2$ H, -OH,
40 substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino
41 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted
42 -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,
43 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and
44 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
45 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
46 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl

WO 03/004488

PCT/US02/20844

-379-

- 47 groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and
48 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
49 -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted
50 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
51 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
52 -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
53 -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
54 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
55 groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
56 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
57 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
58 aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
59 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocyclyloxy,
60 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
61 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
62 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
63 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
64 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
65 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
66 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
67 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
68 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
69 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
70 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
71 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
72 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
73 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
74 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
75 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
76 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-380-

- 77 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
78 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
79 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula
80 -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2
81 oxygen atoms;
- 82 R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, substituted and
83 unsubstituted alkyl groups, substituted and unsubstituted amino groups, substituted
84 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-O-alkyl
85 groups, substituted and unsubstituted arylalkoxy groups, substituted and
86 unsubstituted saturated heterocyclyloxy groups, substituted and unsubstituted
87 alkoxyalkyl groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted
88 and unsubstituted saturated heterocycl groups, substituted and unsubstituted
89 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted -N(H)-C(=O)-aryl
90 groups, substituted and unsubstituted -N(H)-(SO₂)-alkyl groups substituted and
91 unsubstituted -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and
92 unsubstituted -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted
93 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
94 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
95 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
96 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
97 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
98 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
99 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
100 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
101 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
102 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
103 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
104 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups;

WO 03/004488

PCT/US02/20844

-381-

105 R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
106 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
107 heterocycloxy groups, substituted and unsubstituted alkoxyalkyl groups,
108 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
109 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
110 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
111 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
112 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl
113 groups, substituted and unsubstituted heterocyclyl groups, substituted and
114 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
115 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
116 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
117 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
118 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
119 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
120 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
121 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
122 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
123 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
124 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
125 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
126 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
127 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
128 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
129 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
130 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
131 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
132 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
133 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-382-

134 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted

135 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

136 R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
137 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
138 amino groups, substituted and unsubstituted alkylamino groups, substituted and
139 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
140 groups, or R^5 is absent if Z^1 is N;

141 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
142 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
143 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
144 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
145 groups; substituted and unsubstituted heterocyclyl groups including substituted and
146 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
147 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
148 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
149 unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups,
150 substituted and unsubstituted amino groups including substituted and unsubstituted
151 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
152 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
153 unsubstituted arylalkylamino groups, and substituted and unsubstituted
154 heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
155 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
156 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
157 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted
158 -C(=O)-heterocyclyl groups; or R^6 is absent if Z^2 is N;

159 R^7 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
160 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including

WO 03/004488

PCT/US02/20844

-383-

161 substituted and unsubstituted heterocyclalkoxy groups, substituted and
162 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
163 groups; substituted and unsubstituted heterocyclyl groups including substituted and
164 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
165 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
166 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
167 unsubstituted heterocyclloxy groups, substituted and unsubstituted aryloxy groups,
168 substituted and unsubstituted amino groups including substituted and unsubstituted
169 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
170 groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and
171 unsubstituted arylalkylamino groups, and substituted and unsubstituted
172 heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
173 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
174 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
175 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted
176 -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

177 R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
178 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
179 amino groups, substituted and unsubstituted alkylamino groups, substituted and
180 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
181 groups, or R⁸ is absent if Z⁴ is N;

182 R⁹ is -H; and

183 R¹⁰ is selected from the group consisting of -H, and substituted and
184 unsubstituted alkyl groups,

185 and further wherein at least one of R¹, R², R³, R⁴, R⁵, R⁶, R⁷ or R⁸ is
186 not -H.

WO 03/004488

PCT/US02/20844

-384-

- 1 22. The compound of claim 21, wherein Z^1 , Z^2 , Z^3 , and Z^4 are C.
- 1 23. The compound of claim 21, wherein R^1 is selected from -H,
2 -F, -Cl, or -Br.
- 1 24. The compound of claim 21, wherein R^2 is selected from the
2 group consisting of -H, -F, -Cl, -CO₂H, substituted and unsubstituted alkyl groups,
3 substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted
4 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
5 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
6 unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted
7 -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl
8 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
9 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
10 -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
11 substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy
12 groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted
13 heterocyclyloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R^2
14 and R^3 are a group of formula -OCH₂O- such that R^2 and R^3 define a fused
15 5-membered ring that includes 2 oxygen atoms.
- 1 25. The compound of claim 21, wherein R^2 is H.
- 1 26. The compound of claim 21, wherein R^2 is an unsubstituted
2 alkoxy group having from 1 to 4 carbon atoms, a substituted or unsubstituted alkyl
3 group, a substituted or unsubstituted arylalkoxy groups, or a substituted or
4 unsubstituted heteroaryloxy group.

WO 03/004488

PCT/US02/20844

-385-

1 27. The compound of claim 21, wherein R³ is selected from the
2 group consisting of -H, -F, -Cl, and -OMe.

1 28. The compound of claim 21, wherein R³ is selected from the
2 group consisting of -F, -Cl, -Br, -CF₃, -C≡N, substituted and unsubstituted alkyl
3 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
4 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
5 -N(H)C(=O)N(H)-aryl groups and substituted and unsubstituted
6 -C(=O)N(H)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula
7 -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2
8 oxygen atoms.

1 29. The compound of claim 21, wherein R⁵ or R⁸ is selected from
2 -H, a -CH₃ group, or a morpholine group.

1 30. The compound of claim 21, wherein R⁶ is selected from the
2 group consisting of -Br, substituted and unsubstituted alkyl groups, substituted and
3 unsubstituted alkoxy groups including substituted and unsubstituted
4 heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
5 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
6 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
7 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
8 unsubstituted -C(=O)N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
9 -C(=O)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups
10 including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted
11 and unsubstituted arylheterocyclyl groups, substituted and unsubstituted
12 alkylheterocyclyl groups, and substituted and unsubstituted cycloalkylheterocyclyl
13 groups; substituted and unsubstituted heterocyclyloxy groups, substituted and
14 unsubstituted aryloxy groups, and substituted and unsubstituted amino groups
15 including substituted and unsubstituted dialkylamino groups, substituted and

WO 03/004488

PCT/US02/20844

-386-

- 16 unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted
17 heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups,
18 and substituted and unsubstituted heterocyclylamino groups.

1 31. The compound of claim 21, wherein R^6 is an alkoxy group
2 having from 1-6 carbon atoms or an alkyl group having from 1-6 carbon atoms.

1 32. The compound of claim 21, wherein R^6 is a substituted alkoxy
2 group having the formula $-OCH_2(CH_2)_mR^{11}$ where m is an integer selected from the
3 group consisting of 0, 1, and 2 and R^{11} is selected from the group consisting of
4 substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl
5 groups, and substituted and unsubstituted heterocyclyl groups.

1 33. The compound of claim 21, wherein R^6 is a substituted amino
2 group having the formula $-N(R^{12})(CH_2)_pR^{13}$ where p is an integer selected from 0, 1,
3 2, or 3, R^{13} is selected from the group consisting of substituted and unsubstituted
4 alkoxy groups, substituted and unsubstituted amino groups, substituted and
5 unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and
6 R^{12} is selected from the group consisting of -H, and substituted and unsubstituted
7 alkyl groups.

1 34. The compound of claim 21, wherein R^6 is a substituted or
2 unsubstituted heterocyclyl group.

1 35. The compound of claim 21, wherein at least one of R^6 or R^7 is
2 -H.

1 36. The compound of claim 21, wherein R^7 is selected from the
2 group consisting of substituted and unsubstituted alkyl groups, substituted and
3 unsubstituted alkoxy groups including substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-387-

4 heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
5 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
6 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
7 substituted and unsubstituted -C(=O)N(H)-heterocycl groups, substituted and
8 unsubstituted -C(=O)N(alkyl)(heterocycl) groups, substituted and unsubstituted
9 -C(=O)-heterocycl groups, substituted and unsubstituted heterocycl groups
10 including substituted and unsubstituted heterocyclheterocycl groups, substituted
11 and unsubstituted arylheterocycl groups, substituted and unsubstituted
12 alkylheterocycl groups and substituted and unsubstituted cycloalkylheterocycl
13 groups; substituted and unsubstituted heterocyclloxy groups, substituted and
14 unsubstituted aryloxy groups, and substituted and unsubstituted amino groups
15 including substituted and unsubstituted dialkylamino groups, substituted and
16 unsubstituted (alkyl)(heterocycl)amino groups, substituted and unsubstituted
17 heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups,
18 and substituted and unsubstituted heterocyclamino groups.

1 37. The compound of claim 21, wherein R⁷ is an alkoxy group
2 having from 1-6 carbon atoms or an alkyl group having from 1-6 carbon atoms.

1 38. The compound of claim 21, wherein R⁷ is selected from the
2 group consisting of a substituted alkoxy group having the formula -OCH₂(CH₂)_nR¹⁴
3 where n is an integer selected from 0, 1, or 2 and R¹⁴ is selected from substituted
4 and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and
5 substituted and unsubstituted heterocycl groups.

1 39. The compound of claim 21, wherein R⁷ is a substituted amino
2 group having the formula -N(R¹⁵)(CH₂)_qR¹⁶ where q is an integer selected from 0, 1,
3 2, or 3, R¹⁶ is selected from the group consisting of substituted and unsubstituted
4 alkoxy groups, substituted and unsubstituted aryl groups, and substituted and

WO 03/004488

PCT/US02/20844

-388-

5 unsubstituted heterocyclyl groups, and R¹⁵ is selected from the group consisting of
6 -H, and substituted and unsubstituted alkyl groups.

1 40. The compound of claim 21, wherein R⁷ is a substituted or
2 unsubstituted heterocyclyl group.

1 41. The compound of claim 21, wherein R³ is selected from -F,
2 -Cl, or -OMe.

1 42. The compound of claim 21, wherein R² is a substituted or
2 unsubstituted amino group selected from the group consisting of substituted and
3 unsubstituted alkylamino groups, dialkylamino groups, cycloalkylamino groups,
4 heterocyclylamino groups, heterocyclylalkylamino groups, arylalkylamino groups,
5 arylalkoxyarylmethylamino groups, and aryloxyarylalkylamino groups.

1 43. The compound of claim 21, wherein R³ is a substituted and
2 unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups where the heterocyclyl group
3 of the -C(=O)N(H)-alkyl-heterocyclyl groups is selected from the group consisting
4 of morpholinyl, piperazinyl, and piperidinyl groups.

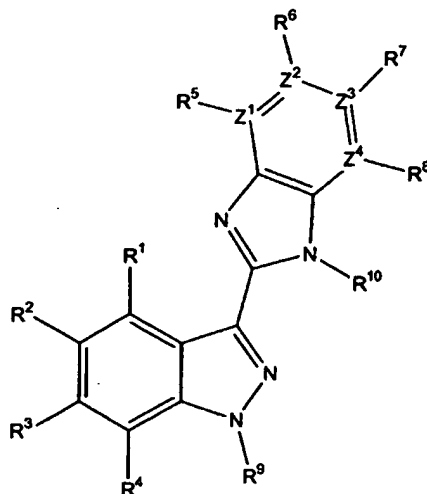
1 44. The compound of claim 21, wherein R² is a substituted or
2 unsubstituted amino group selected from the group consisting of substituted and
3 unsubstituted alkylamino groups, dialkylamino groups, cycloalkylamino groups,
4 heterocyclylamino groups, heterocyclylalkylamino groups, arylalkylamino groups,
5 arylalkoxyarylmethylamino groups, and aryloxyarylalkylamino groups.

WO 03/004488

PCT/US02/20844

-389-

- 1 45. A compound having the structure I, a tautomer of the
 2 compound, a pharmaceutically acceptable salt of the compound, or a
 3 pharmaceutically acceptable salt of the tautomer



I

4
 5 wherein

6 Z¹, Z², Z³, and Z⁴ are independently selected from C or N;

7 R¹ is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
 8 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and
 9 unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
 10 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
 11 unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
 12 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
 13 unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl
 14 groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
 15 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
 16 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
 17 groups, substituted and unsubstituted amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-390-

- 18 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
19 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
20 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
21 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
22 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
23 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
24 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
26 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
27 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
29 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
30 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
31 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
32 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
33 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
34 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
35 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
36 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
37 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
38 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 39 R^2 is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH,
40 substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino
41 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted
42 -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,
43 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and
44 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
45 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
46 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl

WO 03/004488

PCT/US02/20844

-391-

- 47 groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and
48 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
49 -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted
50 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
51 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
52 -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
53 -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
54 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
55 groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
56 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
57 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
58 aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
59 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocycloxy,
60 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
61 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
62 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
63 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
64 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
65 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
66 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
67 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
68 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
69 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
70 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
71 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
72 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
73 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
74 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
75 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
76 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-392-

- 77 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
78 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
79 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula
80 -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2
81 oxygen atoms;
- 82 R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H,
83 substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
84 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
85 -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
86 and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
87 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
88 unsubstituted aryloxy group, substituted and unsubstituted heterocyclyl groups,
89 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
90 unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
91 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
92 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
93 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
94 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
95 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
96 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
97 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
98 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
99 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
100 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
101 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
102 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
103 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
104 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
105 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-393-

- 106 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
107 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
108 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
109 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
110 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
111 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
112 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
113 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
114 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
115 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 116 R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
117 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
118 heterocyclioxy groups, substituted and unsubstituted alkoxyalkyl groups,
119 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
120 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
121 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
122 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
123 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl
124 groups, substituted and unsubstituted heterocyclyl groups, substituted and
125 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
126 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
127 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
128 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
129 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
130 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
131 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
132 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
133 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
134 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-394-

- 135 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
136 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
137 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
138 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
139 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
140 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
141 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
142 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
143 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
144 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
145 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
146 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

- 147 R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
148 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
149 amino groups, substituted and unsubstituted alkylamino groups, substituted and
150 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
151 groups, or R^5 is absent if Z^1 is N;

- 152 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
153 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
154 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
155 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
156 groups; substituted and unsubstituted heterocyclyl groups including substituted and
157 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
158 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
159 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
160 unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups,
161 substituted and unsubstituted amino groups including substituted and unsubstituted
162 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino

WO 03/004488

PCT/US02/20844

-395-

163 groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and
164 unsubstituted arylalkylamino groups, and substituted and unsubstituted
165 heterocyclamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
166 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
167 -C(=O)N(H)-heterocycl groups, substituted and unsubstituted
168 -C(=O)N(alkyl)(heterocycl) groups, and substituted and unsubstituted
169 -C(=O)-heterocycl groups; or R⁶ is absent if Z² is N;

170 R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
171 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
172 substituted and unsubstituted heterocyclalkoxy groups, substituted and
173 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
174 groups; substituted and unsubstituted heterocycl groups including substituted and
175 unsubstituted heterocyclheterocycl groups, substituted and unsubstituted
176 arylheterocycl groups, substituted and unsubstituted alkylheterocycl groups, and
177 substituted and unsubstituted cycloalkylheterocycl groups; substituted and
178 unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups,
179 substituted and unsubstituted amino groups including substituted and unsubstituted
180 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocycl)amino
181 groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and
182 unsubstituted arylalkylamino groups, and substituted and unsubstituted
183 heterocyclamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
184 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
185 -C(=O)N(H)-heterocycl groups, substituted and unsubstituted
186 -C(=O)N(alkyl)(heterocycl) groups, and substituted and unsubstituted
187 -C(=O)-heterocycl groups; or R⁷ is absent if Z³ is N;

188 R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
189 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
190 amino groups, substituted and unsubstituted alkylamino groups, substituted and

WO 03/004488

PCT/US02/20844

-396-

191 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocycl
192 groups, or R^8 is absent if Z^4 is N;

193 R^9 is -H; and

194 R^{10} is selected from the group consisting of -H, and substituted and
195 unsubstituted alkyl groups,

196 and further wherein at least one of Z^2 or Z^3 is C and at least one of R^6
197 or R^7 is selected from the group consisting of -Br, -CO₂H, substituted and
198 unsubstituted heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy
199 groups, substituted and unsubstituted alkoxyalkoxy groups, substituted and
200 unsubstituted heterocyclheterocycl groups, substituted and unsubstituted
201 arylheterocycl groups, substituted and unsubstituted cycloalkylheterocycl
202 groups, substituted and unsubstituted heterocyclloxy groups, substituted and
203 unsubstituted aryloxy groups, substituted and unsubstituted
204 (alkyl)(heterocycl)amino groups, substituted and unsubstituted
205 heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups,
206 substituted and unsubstituted heterocycllamino groups, substituted and
207 unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
208 -C(=O)N(H)-heterocycl groups, substituted and unsubstituted
209 -C(=O)N(alkyl)(heterocycl) groups, and substituted and unsubstituted
210 -C(=O)-heterocycl groups.

1 46. The compound of claim 45, wherein R^3 is selected from the
2 group consisting of -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H, substituted and
3 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
4 and unsubstituted alkoxy groups, and substituted and unsubstituted
5 -C(=O)N(H)-alkyl-heterocycl groups.

WO 03/004488

PCT/US02/20844

-397-

1 47. The compound of claim 45, wherein R³ is selected from the
2 group consisting of -F, -Cl, -Br, -CF₃, -C≡N, substituted and unsubstituted alkyl
3 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
4 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
5 -N(H)C(=O)N(H)-aryl groups, and substituted and unsubstituted
6 -C(=O)N(H)-alkyl-heterocyclyl groups.

1 48. The compound of claim 45, wherein R¹ is selected from -H,
2 -F, -Cl, or -Br.

1 49. The compound of claim 45, wherein R² is selected from the
2 group consisting of -H, -F, -Cl, -CO₂H, substituted and unsubstituted alkyl groups,
3 substituted and unsubstituted -C(=O)O-alkyl groups, substituted and unsubstituted
4 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
5 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
6 unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted
7 -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl
8 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
9 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
10 -N(H)-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
11 substituted and unsubstituted alkoxy groups, substituted and unsubstituted arylalkoxy
12 groups, substituted and unsubstituted aryloxy groups, substituted and unsubstituted
13 heterocyclyloxy, and substituted and unsubstituted heterocyclylalkoxy groups; or R²
14 and R³ are a group of formula -OCH₂O- such that R² and R³ define a fused
15 5-membered ring that includes 2 oxygen atoms.

1 50. The compound of claim 45, wherein R² is H.

WO 03/004488

PCT/US02/20844

-398-

1 51. The compound of claim 45, wherein R² is an unsubstituted
2 alkoxy group having from 1 to 4 carbon atoms, a substituted or unsubstituted alkyl
3 group, a substituted or unsubstituted aryloxy group, or a substituted or unsubstituted
4 heteroaryloxy group.

1 52. The compound of claim 45, wherein R³ is selected from the
2 group consisting of -H, -F, -Cl, and -OMe.

1 53. The compound of claim 45, wherein R⁵ or R⁸ is selected from
2 -H, a -CH₃ group, or a morpholine group.

1 54. The compound of claim 45, wherein R⁶ is selected from the
2 group consisting of -Br, substituted and unsubstituted alkyl groups, substituted and
3 unsubstituted alkoxy groups including substituted and unsubstituted
4 heterocyclalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
5 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
6 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
7 substituted and unsubstituted -C(=O)N(H)-heterocycl groups, substituted and
8 unsubstituted -C(=O)N(alkyl)(heterocycl) groups, substituted and unsubstituted
9 -C(=O)-heterocycl groups, substituted and unsubstituted heterocycl groups
10 including substituted and unsubstituted heterocyclheterocycl groups, substituted
11 and unsubstituted arylheterocycl groups, substituted and unsubstituted
12 alkylheterocycl groups, and substituted and unsubstituted cycloalkylheterocycl
13 groups; substituted and unsubstituted heterocyclcyloxy groups, substituted and
14 unsubstituted aryloxy groups, and substituted and unsubstituted amino groups
15 including substituted and unsubstituted dialkylamino groups, substituted and
16 unsubstituted (alkyl)(heterocycl)amino groups, substituted and unsubstituted
17 heterocyclalkylamino groups, substituted and unsubstituted arylalkylamino groups,
18 and substituted and unsubstituted heterocycllamino groups.

WO 03/004488

PCT/US02/20844

-399-

1 55. The compound of claim 45, wherein R⁶ is an alkoxy group
2 having from 1-6 carbon atoms or an alkyl group having from 1-6 carbon atoms.

1 56. The compound of claim 45, wherein R⁶ is a substituted alkoxy
2 group having the formula -OCH₂(CH₂)_mR¹¹ where m is an integer selected from the
3 group consisting of 0, 1, and 2 and R¹¹ is selected from the group consisting of
4 substituted and unsubstituted alkoxy groups, substituted and unsubstituted aryl
5 groups, and substituted and unsubstituted heterocyclyl groups.

1 57. The compound of claim 45, wherein R⁶ is a substituted amino
2 group having the formula -N(R¹²)(CH₂)_pR¹³ where p is an integer selected from 0, 1,
3 2, or 3, R¹³ is selected from the group consisting of substituted and unsubstituted
4 alkoxy groups, substituted and unsubstituted amino groups, substituted and
5 unsubstituted aryl groups, and substituted and unsubstituted heterocyclyl groups, and
6 R¹² is selected from the group consisting of -H, and substituted and unsubstituted
7 alkyl groups.

1 58. The compound of claim 45, wherein R⁶ is a substituted or
2 unsubstituted heterocyclyl group.

1 59. The compound of claim 45, wherein at least one of R⁶ or R⁷ is
2 -H.

1 60. The compound of claim 45, wherein R⁷ is selected from the
2 group consisting of substituted and unsubstituted alkyl groups, substituted and
3 unsubstituted alkoxy groups including substituted and unsubstituted
4 heterocyclylalkoxy groups, substituted and unsubstituted arylalkoxy groups, and
5 substituted and unsubstituted alkoxyalkoxy groups; substituted and unsubstituted
6 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,

WO 03/004488

PCT/US02/20844

-400-

7 substituted and unsubstituted $-C(=O)N(H)$ -heterocyclyl groups, substituted and
8 unsubstituted $-C(=O)N(\text{alkyl})(\text{heterocyclyl})$ groups, substituted and unsubstituted
9 $-C(=O)$ -heterocyclyl groups, substituted and unsubstituted heterocyclyl groups
10 including substituted and unsubstituted heterocyclylheterocyclyl groups, substituted
11 and unsubstituted arylheterocyclyl groups, substituted and unsubstituted
12 alkylheterocyclyl groups and substituted and unsubstituted cycloalkylheterocyclyl
13 groups; substituted and unsubstituted heterocycliloxy groups, substituted and
14 unsubstituted aryloxy groups, and substituted and unsubstituted amino groups
15 including substituted and unsubstituted dialkylamino groups, substituted and
16 unsubstituted (alkyl)(heterocyclyl)amino groups, substituted and unsubstituted
17 heterocyclylalkylamino groups, substituted and unsubstituted arylalkylamino groups,
18 and substituted and unsubstituted heterocyclylamino groups.

1 61. The compound of claim 45, wherein R^7 is an alkoxy group
2 having from 1-6 carbon atoms or an alkyl group having from 1-6 carbon atoms.

1 62. The compound of claim 45, wherein R^7 is selected from the
2 group consisting of a substituted alkoxy group having the formula $-OCH_2(CH_2)_nR^{14}$
3 where n is an integer selected from 0, 1, or 2 and R^{14} is selected from substituted
4 and unsubstituted alkoxy groups, substituted and unsubstituted aryl groups, and
5 substituted and unsubstituted heterocyclyl groups.

1 63. The compound of claim 45, wherein R^7 is a substituted amino
2 group having the formula $-N(R^{15})(CH_2)_qR^{16}$ where q is an integer selected from 0, 1,
3 2, or 3, R^{16} is selected from the group consisting of substituted and unsubstituted
4 alkoxy groups, substituted and unsubstituted aryl groups, and substituted and
5 unsubstituted heterocyclyl groups, and R^{15} is selected from the group consisting of
6 $-H$, and substituted and unsubstituted alkyl groups.

WO 03/004488

PCT/US02/20844

-401-

1 64. The compound of claim 45, wherein R⁷ is a substituted or
2 unsubstituted heterocyclyl group.

1 65. The compound of claim 45, wherein R³ is selected from -F,
2 -Cl, or -OMe.

1 66. The compound of claim 45, wherein R² is a substituted or
2 unsubstituted amino group selected from the group consisting of substituted and
3 unsubstituted alkylamino groups, dialkylamino groups, heterocyclylamino,
4 heterocyclylalkylamino groups, heterocyclylamino groups, arylalkylamino groups,
5 arylalkoxyarylmethylamino groups, and aryloxyarylalkylamino groups.

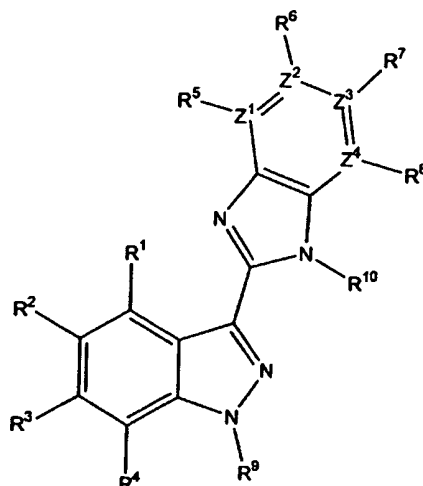
1 67. The compound of claim 45, wherein R³ is a substituted and
2 unsubstituted -C(=O)N(H)-alkyl-heterocyclyl groups where the heterocyclyl group
3 of the -C(=O)N(H)-alkyl-heterocyclyl groups is selected from the group consisting
4 of morpholinyl, piperazinyl, and piperidinyl groups.

WO 03/004488

PCT/US02/20844

-402-

- 1 68. A compound having the structure I, a tautomer of the
 2 compound, a pharmaceutically acceptable salt of the compound, or a
 3 pharmaceutically acceptable salt of the tautomer



I

4 wherein

5 Z¹, Z², Z³, and Z⁴ are independently selected from C or N;

6 R¹ is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
 7 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and
 8 unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
 9 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
 10 unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
 11 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
 12 unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl
 13 groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
 14 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
 15 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
 16 groups, substituted and unsubstituted amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-403-

- 18 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
19 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
20 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
21 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
22 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
23 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
24 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
26 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
27 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
29 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
30 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
31 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
32 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
33 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
34 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
35 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
36 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
37 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
38 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

39 R^2 is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH,
40 substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino
41 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted
42 -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,
43 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and
44 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
45 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
46 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl

WO 03/004488

PCT/US02/20844

-404-

- 47 groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and
48 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
49 -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted
50 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
51 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
52 -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
53 -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
54 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
55 groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
56 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
57 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
58 aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
59 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocycliloxy,
60 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
61 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
62 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
63 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
64 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
65 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
66 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
67 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
68 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
69 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
70 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
71 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
72 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
73 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
74 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
75 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
76 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-405-

77 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
78 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
79 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups; or R² and R³ are a group of formula
80 -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2
81 oxygen atoms;

82 R³ is selected from -F, -Cl, -Br, -CF₃, -C≡N, substituted and
83 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups, substituted
84 and unsubstituted arylalkoxy groups, substituted and unsubstituted saturated
85 heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups,
86 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
87 saturated heterocycl groups, substituted and unsubstituted -N(H)-C(=O)-alkyl
88 groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted and
89 unsubstituted -N(H)-(SO₂)-alkyl groups substituted and unsubstituted
90 -N(H)-(SO₂)-aryl groups, -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted
91 -N(H)-(SO₂)-heterocyclyl groups, substituted and unsubstituted
92 -N(H)C(=O)N(H)-alkyl groups, and substituted and unsubstituted
93 -N(H)C(=O)N(H)-aryl;

94 R⁴ is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
95 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
96 heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl groups,
97 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
98 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
99 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
100 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
101 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl
102 groups, substituted and unsubstituted heterocyclyl groups, substituted and
103 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
104 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl

WO 03/004488

PCT/US02/20844

-406-

105 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
106 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
107 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
108 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
109 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
110 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
111 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
112 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
113 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
114 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
115 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
116 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
117 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
118 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
119 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
120 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
121 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
122 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
123 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
124 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

125 R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
126 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
127 amino groups, substituted and unsubstituted alkylamino groups, substituted and
128 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
129 groups, or R^5 is absent if Z^1 is N;

130 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
131 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
132 substituted and unsubstituted heterocyclylalkoxy groups, substituted and

WO 03/004488

PCT/US02/20844

-407-

133 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
134 groups; substituted and unsubstituted heterocyclyl groups including substituted and
135 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
136 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
137 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
138 unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups,
139 substituted and unsubstituted amino groups including substituted and unsubstituted
140 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
141 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
142 unsubstituted arylalkylamino groups, and substituted and unsubstituted
143 heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups,
144 substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted
145 $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted
146 $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted
147 $-C(=O)$ -heterocyclyl groups; or R^6 is absent if Z^2 is N;

148 R^7 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
149 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
150 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
151 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
152 groups; substituted and unsubstituted heterocyclyl groups including substituted and
153 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
154 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
155 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
156 unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups,
157 substituted and unsubstituted amino groups including substituted and unsubstituted
158 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
159 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
160 unsubstituted arylalkylamino groups, and substituted and unsubstituted
161 heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups,

WO 03/004488

PCT/US02/20844

-408-

162 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
163 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
164 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted
165 -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

166 R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
167 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
168 amino groups, substituted and unsubstituted alkylamino groups, substituted and
169 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
170 groups, or R⁸ is absent if Z⁴ is N;

171 R⁹ is -H; and

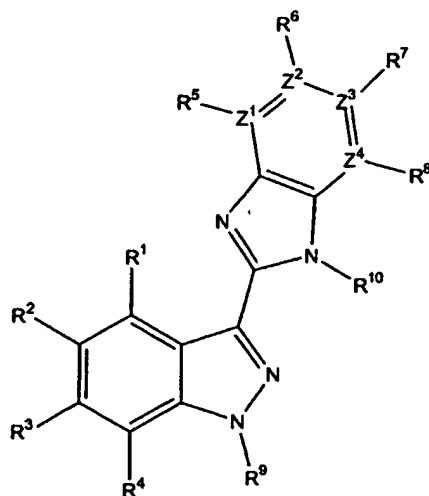
172 R¹⁰ is selected from the group consisting of -H, and substituted and
173 unsubstituted alkyl groups.

WO 03/004488

PCT/US02/20844

-409-

- 1 69. A compound having the structure I, a tautomer of the
2 compound, a pharmaceutically acceptable salt of the compound, or a
3 pharmaceutically acceptable salt of the tautomer



I

4
5 wherein

6 Z¹, Z², Z³, and Z⁴ are independently selected from C or N;

7 R¹ is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
8 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and
9 unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
10 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
11 unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
12 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
13 unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl
14 groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
15 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
16 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
17 groups, substituted and unsubstituted amino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-410-

- 18 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
19 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
20 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
21 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
22 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
23 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
24 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
26 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
27 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
29 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
30 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
31 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
32 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
33 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
34 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
35 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
36 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
37 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
38 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

39 R^2 is selected from -F, -Cl, -Br, -C \equiv N, -CO₂H, -OH, substituted and
40 unsubstituted guanidiny groups, substituted and unsubstituted -C(=O)O-alkyl
41 groups, substituted and unsubstituted -C(=O)O-aryl groups, substituted and
42 unsubstituted -C(=O)O-heteroaryl groups, substituted and unsubstituted
43 -C(=O)N(H)-alkyl groups, substituted and unsubstituted -C(=O)N(H)-aryl groups,
44 substituted and unsubstituted -C(=O)N(H)-heterocyclyl groups, substituted and
45 unsubstituted -N(H)C(=O)-alkyl groups, substituted and unsubstituted
46 -N(H)C(=O)-aryl groups, substituted and unsubstituted -N(H)C(=O)-heterocyclyl

WO 03/004488

PCT/US02/20844

-411-

47 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
48 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
49 -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
50 -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
51 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
52 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
53 arylalkoxy groups, substituted and unsubstituted aryloxy groups, substituted and
54 unsubstituted heterocyclyloxy, and substituted and unsubstituted heterocyclylalkoxy
55 groups; or R² and R³ are a group of formula -OCH₂O- such that R² and R³ define a
56 fused 5-membered ring that includes 2 oxygen atoms;

57 R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H,
58 substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
59 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
60 -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
61 and unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl
62 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
63 unsubstituted aryloxy group, substituted and unsubstituted heterocyclyl groups,
64 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
65 unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
66 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
67 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
68 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
69 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
70 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
71 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
72 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
73 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
74 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
75 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-412-

- 76 (alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
77 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
78 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
79 -alkyl-N(alkyl)-C(=O)-heterocyclalkyl groups, substituted and unsubstituted
80 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
81 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclalkyl groups, substituted and unsubstituted
82 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
83 substituted and unsubstituted heterocyclalkylaminoalkyl groups substituted and
84 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
85 heterocyclalkylaminoalkyl groups, substituted and unsubstituted
86 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
87 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
88 -alkyl-N(H)-C(=O)-heterocyclalkyl groups, substituted and unsubstituted
89 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
90 -alkyl-N(H)-C(=O)-alkyl-heterocyclalkyl groups;
- 91 R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
92 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
93 heterocyclalkoxy groups, substituted and unsubstituted alkoxyalkyl groups,
94 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
95 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
96 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
97 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
98 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclalkyl
99 groups, substituted and unsubstituted heterocyclalkyl groups, substituted and
100 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
101 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
102 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclalkyl groups,
103 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
104 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-413-

- 105 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
106 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
107 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
108 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
109 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
110 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
111 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
112 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
113 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
114 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
115 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
116 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
117 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
118 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
119 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
120 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
121 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 122 R^5 is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
123 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
124 amino groups, substituted and unsubstituted alkylamino groups, substituted and
125 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
126 groups, or R^5 is absent if Z^1 is N;
- 127 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
128 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
129 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
130 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
131 groups; substituted and unsubstituted heterocyclyl groups including substituted and
132 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-414-

- 133 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
134 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
135 unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups,
136 substituted and unsubstituted amino groups including substituted and unsubstituted
137 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
138 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
139 unsubstituted arylalkylamino groups, and substituted and unsubstituted
140 heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
141 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
142 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
143 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted
144 -C(=O)-heterocyclyl groups; or R⁶ is absent if Z² is N;
- 145 R⁷ is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
146 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
147 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
148 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
149 groups; substituted and unsubstituted heterocyclyl groups including substituted and
150 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
151 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
152 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
153 unsubstituted heterocyclyloxy groups, substituted and unsubstituted aryloxy groups,
154 substituted and unsubstituted amino groups including substituted and unsubstituted
155 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
156 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
157 unsubstituted arylalkylamino groups, and substituted and unsubstituted
158 heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
159 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
160 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-415-

161 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted

162 -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

163 R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl

164 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted

165 amino groups, substituted and unsubstituted alkylamino groups, substituted and

166 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl

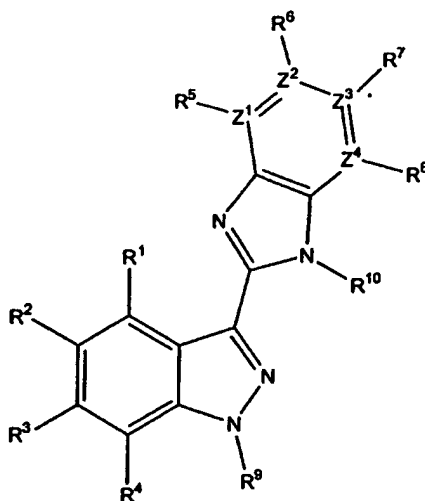
167 groups, or R⁸ is absent if Z⁴ is N;

168 R⁹ is -H; and

169 R¹⁰ is selected from the group consisting of -H, and substituted and

170 unsubstituted alkyl groups.

1 70. A compound having the structure I, a tautomer of the
2 compound, a pharmaceutically acceptable salt of the compound, or a
3 pharmaceutically acceptable salt of the tautomer



I

4

5

wherein

WO 03/004488

PCT/US02/20844

-416-

6 Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

7 R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
8 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and
9 unsubstituted heterocyclyloxy groups, substituted and unsubstituted alkoxyalkyl
10 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
11 unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
12 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
13 unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl
14 groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
15 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
16 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
17 groups, substituted and unsubstituted amino groups, substituted and unsubstituted
18 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
19 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
20 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
21 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
22 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
23 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
24 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
26 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
27 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
29 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
30 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
31 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
32 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
33 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
34 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-417-

- 35 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
36 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
37 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
38 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 39 R^2 is selected from -H, -F, -Cl, -Br, -C≡N, -NO₂, -CO₂H, -OH,
40 substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino
41 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted
42 -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,
43 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and
44 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
45 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
46 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl
47 groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and
48 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
49 -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted
50 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
51 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
52 -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
53 -N(H)-(SO₂)-alkyl groups, substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
54 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocyclyl
55 groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
56 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
57 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
58 aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
59 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocycloxy,
60 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
61 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
62 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
63 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-418-

- 64 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
65 (alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
66 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
67 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
68 -alkyl-N(alkyl)-C(=O)-heterocycl groups, substituted and unsubstituted
69 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
70 -alkyl-N(alkyl)-C(=O)-alkyl-heterocycl groups, substituted and unsubstituted
71 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
72 substituted and unsubstituted heterocyclaminoalkyl groups substituted and
73 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
74 heterocyclalkylaminoalkyl groups, substituted and unsubstituted
75 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
76 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
77 -alkyl-N(H)-C(=O)-heterocycl groups, substituted and unsubstituted
78 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
79 -alkyl-N(H)-C(=O)-alkyl-heterocycl groups; or R² and R³ are a group of formula
80 -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2
81 oxygen atoms;
- 82 R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H,
83 substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
84 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
85 -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
86 and unsubstituted heterocyclloxy groups, substituted and unsubstituted alkoxyalkyl
87 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
88 unsubstituted aryloxy group, substituted and unsubstituted heterocycl groups,
89 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
90 unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
91 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
92 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocycl

WO 03/004488

PCT/US02/20844

-419-

93 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
94 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
95 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-
96 heterocyclyl groups, substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups,
97 substituted and unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and
98 unsubstituted (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
99 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
100 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
101 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
102 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
103 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
104 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
105 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
106 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
107 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
108 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
109 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
110 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
111 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
112 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
113 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
114 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

115 R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
116 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
117 heterocycliloxy groups, substituted and unsubstituted alkoxyalkyl groups,
118 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
119 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
120 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
121 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,

WO 03/004488

PCT/US02/20844

-420-

- 122 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl
123 groups, substituted and unsubstituted heterocyclyl groups, substituted and
124 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
125 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
126 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
127 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
128 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
129 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
130 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
131 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
132 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
133 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
134 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
135 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
136 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
137 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
138 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
139 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
140 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
141 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
142 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
143 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
144 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
145 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 146 R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
147 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
148 amino groups, substituted and unsubstituted alkylamino groups, substituted and
149 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
150 groups, or R⁵ is absent if Z¹ is N;

WO 03/004488

PCT/US02/20844

-421-

151 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
152 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
153 substituted and unsubstituted heterocyclalkoxy groups, substituted and
154 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
155 groups; substituted and unsubstituted heterocycl groups including substituted and
156 unsubstituted heterocyclheterocycl groups, substituted and unsubstituted
157 arylheterocycl groups, substituted and unsubstituted alkylheterocycl groups, and
158 substituted and unsubstituted cycloalkylheterocycl groups; substituted and
159 unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups,
160 substituted and unsubstituted amino groups including substituted and unsubstituted
161 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocycl)amino
162 groups, substituted and unsubstituted heterocyclalkylamino groups, substituted and
163 unsubstituted arylalkylamino groups, and substituted and unsubstituted
164 heterocyclamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
165 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
166 -C(=O)N(H)-heterocycl groups, substituted and unsubstituted
167 -C(=O)N(alkyl)(heterocycl) groups, and substituted and unsubstituted
168 -C(=O)-heterocycl groups; or R^6 is absent if Z^2 is N;

169 R^7 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
170 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
171 substituted and unsubstituted heterocyclalkoxy groups, substituted and
172 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
173 groups; substituted and unsubstituted heterocycl groups including substituted and
174 unsubstituted heterocyclheterocycl groups, substituted and unsubstituted
175 arylheterocycl groups, substituted and unsubstituted alkylheterocycl groups, and
176 substituted and unsubstituted cycloalkylheterocycl groups; substituted and
177 unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups,
178 substituted and unsubstituted amino groups including substituted and unsubstituted
179 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocycl)amino

WO 03/004488

PCT/US02/20844

-422-

180 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
181 unsubstituted arylalkylamino groups, and substituted and unsubstituted
182 heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
183 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
184 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
185 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted
186 -C(=O)-heterocyclyl groups; or R⁷ is absent if Z³ is N;

187 R⁸ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
188 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
189 amino groups, substituted and unsubstituted alkylamino groups, substituted and
190 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
191 groups, or R⁸ is absent if Z⁴ is N;

192 R⁹ is -H; and

193 R¹⁰ is selected from the group consisting of -H, and substituted and
194 unsubstituted alkyl groups,

195 and further wherein at least one of Z² or Z³ is C and at least one of R⁶
196 or R⁷ is selected from the group consisting of substituted and unsubstituted
197 piperidinyl substituted heterocyclyl groups, substituted and unsubstituted
198 heterocyclyl substituted piperidinyl groups, substituted and unsubstituted
199 hydroxymethyl substituted piperidinyl groups, dimethylaminoalkyl substituted
200 pyrrolidinyl groups, substituted and unsubstituted 3-alkyl substituted piperazinyl
201 groups, substituted and unsubstituted 3,5-dialkyl substituted piperazinyl groups,
202 substituted and unsubstituted N-hydroxyalkyl substituted piperazinyl groups,
203 substituted and unsubstituted 1,4-diazacycloheptyl groups, substituted and
204 unsubstituted 1-aza-4-oxacycloheptane groups, substituted and unsubstituted N-
205 ethylpiperazinyl groups, substituted and unsubstituted N-isopropylpiperazinyl

WO 03/004488

PCT/US02/20844

-423-

206 groups, substituted and unsubstituted N-sec-butylpiperazinyl groups, substituted and
207 unsubstituted N-2-pyridyl substituted piperazinyl groups, substituted and
208 unsubstituted N-3-pyridyl substituted piperazinyl groups, substituted and
209 unsubstituted N-4-pyridyl substituted piperazinyl groups, substituted and
210 unsubstituted N(H)-CH₂-pyridyl groups, substituted and unsubstituted imidazolyl
211 groups, substituted and unsubstituted 3-alkyl substituted morpholinyl groups,
212 substituted and unsubstituted 3,5-dialkyl substituted morpholinyl groups,
213 dialkylamino substituted pyrrolidinyl groups, pyrrolidinyl groups substituted with
214 both dialkylamino and alkyl groups, substituted and unsubstituted 4-hydroxy
215 substituted piperidinyl groups, substituted and unsubstituted 4-aryl substituted
216 piperidinyl groups, substituted and unsubstituted 4-hydroxy-4-phenyl substituted
217 piperidinyl groups, substituted and unsubstituted cyclohexylpiperazinyl groups,
218 substituted and unsubstituted cyclopentylpiperazinyl groups, substituted and
219 unsubstituted N-alkyl substituted diazabicycloalkane groups, substituted and
220 unsubstituted -N(CH₃)(N-alkyl(4-piperidinyl)) groups, substituted and unsubstituted
221 piperazinyl groups further substituted with a -C(=O)-alkyl group bonded to one of
222 the N atoms of the piperazinyl group, substituted and unsubstituted
223 -N(H)CH₂CH₂CH₂-imidazolyl groups, substituted and unsubstituted
224 -N(H)CH₂CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted
225 -N(H)CH₂CH₂CH₂-morpholinyl groups, substituted and unsubstituted
226 -N(H)CH₂CH₂CH₂-piperazinyl groups, substituted and unsubstituted
227 -N(H)CH₂CH₂CH₂-piperidinyl groups, substituted and unsubstituted
228 -N(H)CH₂CH₂CH₂-pyridyl groups, substituted and unsubstituted
229 -N(H)CH₂CH₂-imidazolyl groups, substituted and unsubstituted
230 -N(H)CH₂CH₂-pyrrolidinyl groups, substituted and unsubstituted
231 -N(H)CH₂CH₂-morpholinyl groups, substituted and unsubstituted
232 -N(H)CH₂CH₂-piperazinyl groups, substituted and unsubstituted
233 -N(H)CH₂CH₂-piperidinyl groups, substituted and unsubstituted
234 -N(H)CH₂CH₂-pyridyl groups, substituted and unsubstituted cyclobutylpiperazinyl
235 groups, substituted and unsubstituted -OCH₂-pyrrolidinyl groups, substituted and

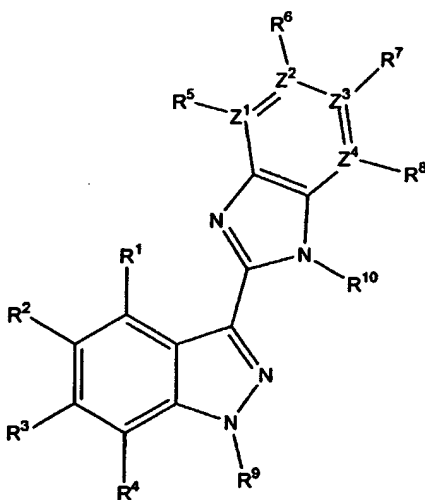
WO 03/004488

PCT/US02/20844

-424-

236 unsubstituted $-\text{OCH}_2\text{CH}_2$ -pyrrolidinyl groups, substituted and unsubstituted
 237 $-\text{OCH}_2\text{CH}_2\text{CH}_2$ -pyrrolidinyl groups, substituted and unsubstituted piperazinyl groups
 238 further substituted with a $-\text{CH}_2\text{C}(=\text{O})-\text{O}$ -alkyl group bonded to one of the N atoms
 239 of the piperazinyl group, substituted and unsubstituted piperazinyl groups further
 240 substituted with a $-\text{C}(=\text{O})-\text{O}$ -alkyl group bonded to one of the N atoms of the
 241 piperazinyl group, substituted and unsubstituted hydroxypyrrolidinyl groups,
 242 substituted and unsubstituted hydroxypiperidinyl groups, substituted and
 243 unsubstituted $-\text{OCH}_2$ -pyridyl groups, substituted and unsubstituted piperidinylamino
 244 groups, substituted and unsubstituted pyridyloxy groups with a $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{alkyl})$
 245 group bonded to a carbon atom of the pyridine ring of the pyridyloxy group, and
 246 substituted and unsubstituted pyridyloxy groups with a $-\text{C}(=\text{O})-\text{N}(\text{alkyl})_2$ group
 247 bonded to a carbon atom of the pyridine ring of the pyridyloxy group.

1 71. A compound having the structure I, a tautomer of the
 2 compound, a pharmaceutically acceptable salt of the compound, or a
 3 pharmaceutically acceptable salt of the tautomer



I

4

5

wherein

WO 03/004488

PCT/US02/20844

-425-

6 Z^1 , Z^2 , Z^3 , and Z^4 are independently selected from C or N;

7 R^1 is selected from -H, -F, -Cl, -Br, -NO₂, -C≡N, -C(=O)-O-alkyl
8 groups, -OH, substituted and unsubstituted arylalkoxy groups, substituted and
9 unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
10 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
11 unsubstituted aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl
12 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
13 unsubstituted -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl
14 groups, -N(H)-SO₂-CF₃ groups, substituted and unsubstituted
15 -N(H)-SO₂-heterocyclyl groups, substituted and unsubstituted heterocyclyl groups,
16 substituted and unsubstituted alkyl groups, substituted and unsubstituted alkoxy
17 groups, substituted and unsubstituted amino groups, substituted and unsubstituted
18 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
19 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
20 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
21 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
22 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
23 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
24 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
25 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
26 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
27 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
29 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
30 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
31 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
32 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
33 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
34 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-426-

- 35 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
36 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
37 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
38 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 39 R^2 is selected from -H, -F, -Cl, -Br, -C \equiv N, -NO $_2$, -CO $_2$ H, -OH,
40 substituted and unsubstituted guanidiny groups, substituted and unsubstituted amino
41 groups, substituted and unsubstituted alkyl groups, substituted and unsubstituted
42 -C(=O)O-alkyl groups, substituted and unsubstituted -C(=O)O-aryl groups,
43 substituted and unsubstituted -C(=O)O-heteroaryl groups, substituted and
44 unsubstituted -C(=O)N(H)-alkyl groups, substituted and unsubstituted
45 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
46 -C(=O)N(H)-aryl groups, substituted and unsubstituted -C(=O)N(H)-heterocyclyl
47 groups, substituted and unsubstituted -N(H)C(=O)-alkyl groups, substituted and
48 unsubstituted -N(H)C(=O)-aryl groups, substituted and unsubstituted
49 -N(H)C(=O)-heterocyclyl groups, substituted and unsubstituted
50 -N(H)C(=O)N(H)-alkyl groups, substituted and unsubstituted
51 -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
52 -N(H)C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
53 -N(H)-(SO $_2$)-alkyl groups, substituted and unsubstituted -N(H)-(SO $_2$)-aryl groups,
54 -N(H)-(SO $_2$)-CF $_3$ groups, substituted and unsubstituted -N(H)-(SO $_2$)-heterocyclyl
55 groups, substituted and unsubstituted -N(H)-heterocyclyl groups, substituted and
56 unsubstituted heterocyclyl groups, substituted and unsubstituted alkoxy groups,
57 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
58 aryloxy groups, substituted and unsubstituted akoxylalkyl groups, substituted and
59 unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted heterocycloxy,
60 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
61 unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
62 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
63 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-427-

- 64 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
65 (alkyl)(heterocyclalkyl)aminoalkyl groups, substituted and unsubstituted
66 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
67 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
68 -alkyl-N(alkyl)-C(=O)-heterocycl groups, substituted and unsubstituted
69 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
70 -alkyl-N(alkyl)-C(=O)-alkyl-heterocycl groups, substituted and unsubstituted
71 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
72 substituted and unsubstituted heterocyclaminoalkyl groups substituted and
73 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
74 heterocyclalkylaminoalkyl groups, substituted and unsubstituted
75 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
76 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
77 -alkyl-N(H)-C(=O)-heterocycl groups, substituted and unsubstituted
78 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
79 -alkyl-N(H)-C(=O)-alkyl-heterocycl groups; or R² and R³ are a group of formula
80 -OCH₂O- such that R² and R³ define a fused 5-membered ring that includes 2
81 oxygen atoms;
- 82 R³ is selected from -H, -F, -Cl, -Br, -CF₃, -C≡N, -NO₂, -CO₂H,
83 substituted and unsubstituted amino groups, substituted and unsubstituted alkyl
84 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
85 -C(=O)-O-alkyl groups, substituted and unsubstituted arylalkoxy groups, substituted
86 and unsubstituted heterocycloxy groups, substituted and unsubstituted alkoxyalkyl
87 groups, substituted and unsubstituted arylalkoxyalkyl groups, substituted and
88 unsubstituted aryloxy group, substituted and unsubstituted heterocycl groups,
89 substituted and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
90 unsubstituted -N(H)-C(=O)-aryl groups, substituted and unsubstituted
91 -N(H)-(SO₂)-alkyl groups substituted and unsubstituted -N(H)-(SO₂)-aryl groups,
92 -N(H)-(SO₂)-CF₃ groups, substituted and unsubstituted -N(H)-(SO₂)-heterocycl

WO 03/004488

PCT/US02/20844

-428-

- 93 groups, substituted and unsubstituted -N(H)C(=O)N(H)-alkyl groups, substituted
94 and unsubstituted -N(H)C(=O)N(H)-aryl groups, substituted and unsubstituted
95 -C(=O)-N(H)-alkyl groups, substituted and unsubstituted
96 -C(=O)-N(H)-alkyl-heterocyclyl groups, substituted and unsubstituted
97 (alkyl)(alkyl)aminoalkyl groups, substituted and unsubstituted
98 (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
99 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
100 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
101 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
102 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
103 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
104 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
105 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
106 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
107 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
108 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
109 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
110 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
111 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
112 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
113 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
114 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
115 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;
- 116 R^4 is -H, -F, -Br, -Cl, -NO₂, -C≡N, -C(=O)-O-alkyl groups, -OH,
117 substituted and unsubstituted arylalkoxy groups, substituted and unsubstituted
118 heterocycliloxy groups, substituted and unsubstituted alkoxyalkyl groups,
119 substituted and unsubstituted arylalkoxyalkyl groups, substituted and unsubstituted
120 aryloxy groups, substituted and unsubstituted -N(H)-C(=O)-aryl groups, substituted
121 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-429-

122 -N(H)-SO₂-alkyl groups, substituted and unsubstituted -N(H)-SO₂-aryl groups,
123 -N(H)-SO₂-CF₃ groups, substituted and unsubstituted -N(H)-SO₂-heterocyclyl
124 groups, substituted and unsubstituted heterocyclyl groups, substituted and
125 unsubstituted amino groups, substituted and unsubstituted alkyl groups, substituted
126 and unsubstituted alkoxy groups, substituted and unsubstituted -C(=O)-N(H)-alkyl
127 groups, substituted and unsubstituted -C(=O)-N(H)-alkyl-heterocyclyl groups,
128 substituted and unsubstituted (alkyl)(alkyl)aminoalkyl groups, substituted and
129 unsubstituted (alkyl)(aryl)aminoalkyl groups, substituted and unsubstituted
130 (alkyl)(heterocyclyl)aminoalkyl groups substituted and unsubstituted
131 (alkyl)(arylalkyl)aminoalkyl groups, substituted and unsubstituted
132 (alkyl)(heterocyclylalkyl)aminoalkyl groups, substituted and unsubstituted
133 -alkyl-N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
134 -alkyl-N(alkyl)-C(=O)-aryl groups, substituted and unsubstituted
135 -alkyl-N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted
136 -alkyl-N(alkyl)-C(=O)-alkyl-aryl groups, substituted and unsubstituted
137 -alkyl-N(alkyl)-C(=O)-alkyl-heterocyclyl groups, substituted and unsubstituted
138 alkylaminoalkyl groups, substituted and unsubstituted arylaminoalkyl groups,
139 substituted and unsubstituted heterocyclylaminoalkyl groups substituted and
140 unsubstituted arylalkylaminoalkyl groups, substituted and unsubstituted
141 heterocyclylalkylaminoalkyl groups, substituted and unsubstituted
142 -alkyl-N(H)-C(=O)-alkyl groups, substituted and unsubstituted
143 -alkyl-N(H)-C(=O)-aryl groups, substituted and unsubstituted
144 -alkyl-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
145 -alkyl-N(H)-C(=O)-alkyl-aryl groups, and substituted and unsubstituted
146 -alkyl-N(H)-C(=O)-alkyl-heterocyclyl groups;

147 R⁵ is selected from -H, -F, -Cl, substituted and unsubstituted alkyl
148 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
149 amino groups, substituted and unsubstituted alkylamino groups, substituted and

WO 03/004488

PCT/US02/20844

-430-

150 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
151 groups, or R^5 is absent if Z^1 is N;

152 R^6 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
153 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
154 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
155 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
156 groups; substituted and unsubstituted heterocyclyl groups including substituted and
157 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
158 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
159 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and
160 unsubstituted heterocycliloxy groups, substituted and unsubstituted aryloxy groups,
161 substituted and unsubstituted amino groups including substituted and unsubstituted
162 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
163 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
164 unsubstituted arylalkylamino groups, and substituted and unsubstituted
165 heterocyclylamino groups; substituted and unsubstituted -C(=O)N(H)-alkyl groups,
166 substituted and unsubstituted -C(=O)N(H)-aryl groups, substituted and unsubstituted
167 -C(=O)N(H)-heterocyclyl groups, substituted and unsubstituted
168 -C(=O)N(alkyl)(heterocyclyl) groups, and substituted and unsubstituted
169 -C(=O)-heterocyclyl groups; or R^6 is absent if Z^2 is N;

170 R^7 is selected from -H, -F, -Cl, -Br, -CF₃, -CO₂H, substituted and
171 unsubstituted alkyl groups, substituted and unsubstituted alkoxy groups including
172 substituted and unsubstituted heterocyclylalkoxy groups, substituted and
173 unsubstituted arylalkoxy groups, and substituted and unsubstituted alkoxyalkoxy
174 groups; substituted and unsubstituted heterocyclyl groups including substituted and
175 unsubstituted heterocyclylheterocyclyl groups, substituted and unsubstituted
176 arylheterocyclyl groups, substituted and unsubstituted alkylheterocyclyl groups, and
177 substituted and unsubstituted cycloalkylheterocyclyl groups; substituted and

WO 03/004488

PCT/US02/20844

-431-

178 unsubstituted heterocycloxy groups, substituted and unsubstituted aryloxy groups,
179 substituted and unsubstituted amino groups including substituted and unsubstituted
180 dialkylamino groups, substituted and unsubstituted (alkyl)(heterocyclyl)amino
181 groups, substituted and unsubstituted heterocyclylalkylamino groups, substituted and
182 unsubstituted arylalkylamino groups, and substituted and unsubstituted
183 heterocyclylamino groups; substituted and unsubstituted $-C(=O)N(H)$ -alkyl groups,
184 substituted and unsubstituted $-C(=O)N(H)$ -aryl groups, substituted and unsubstituted
185 $-C(=O)N(H)$ -heterocyclyl groups, substituted and unsubstituted
186 $-C(=O)N(alkyl)(heterocyclyl)$ groups, and substituted and unsubstituted
187 $-C(=O)$ -heterocyclyl groups; or R^7 is absent if Z^3 is N;

188 R^8 is selected from $-H$, $-F$, $-Cl$, substituted and unsubstituted alkyl
189 groups, substituted and unsubstituted alkoxy groups, substituted and unsubstituted
190 amino groups, substituted and unsubstituted alkylamino groups, substituted and
191 unsubstituted dialkylamino groups, and substituted and unsubstituted heterocyclyl
192 groups, or R^8 is absent if Z^4 is N;

193 R^9 is $-H$; and

194 R^{10} is selected from the group consisting of $-H$, and substituted and
195 unsubstituted alkyl groups,

196 and further wherein at least one of the following is true:

197 (i) R^1 is selected from the group consisting of unsubstituted $-NH_2$
198 groups, and substituted and unsubstituted pyrrolidinylalkylamino groups;

199 (ii) R^2 is selected from the group consisting of substituted and
200 unsubstituted thiazolylalkylamino groups, substituted and unsubstituted

WO 03/004488

PCT/US02/20844

-432-

201 pyrrolidinylalkylamino groups, and substituted and unsubstituted aminoalkylamino
202 groups; or

203 (iii) R^3 is selected from the group consisting of substituted and
204 unsubstituted thiazolylalkylamino groups, substituted and unsubstituted
205 benzimidazolylalkylamino groups, substituted and unsubstituted
206 imidazolylalkylamino groups, substituted and unsubstituted furanylalkylamino
207 groups, and substituted and unsubstituted arylalkylamino groups.

INTERNATIONAL SEARCH REPORT

 International Application No
 PCT/US 02/20844

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 C07D403/04 C07D471/04 C07D487/08 C07D473/00 C07D401/14 C07D403/14 C07D491/04 A61K31/4184 A61P5/50 A61P25/00 A61P25/16 A61P37/02		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 C07D A61K A61P		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the International search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ, BEILSTEIN Data, CHEM ABS Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 01 53268 A (AGOURON PHARMA) 26 July 2001 (2001-07-26) cited in the application Abstract; page 1, lines 9-15; claims 1,13,22.	21
X	WO 01 02369 A (AGOURON PHARMA) 11 January 2001 (2001-01-11) cited in the application Abstract; claim 1; claim 12, first formula; e.g. examples 42(b), 53(a)-(g), 55.	1-71
<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "Z" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
14 November 2002		21/11/2002
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel (+31-70) 340-2040, Tx. 31 851 epo nl, Fax (+31-70) 340-3016		Authorized officer Weisbrod, T

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/20844

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 0153268	A	26-07-2001	AU	2953901 A	31-07-2001
			EP	1250326 A2	23-10-2002
			WO	0153268 A2	26-07-2001
			US	2002161022 A1	31-10-2002
<hr/>					
WO 0102369	A	11-01-2001	AU	5785200 A	22-01-2001
			BG	6380 A	30-09-2002
			BR	0012352 A	14-05-2002
			CN	1374950 T	16-10-2002
			EP	1218348 A2	03-07-2002
			NO	20015797 A	01-03-2002
			WO	0102369 A2	11-01-2001
<hr/>					